A Framework for the Design and Evaluation of Virtual World Programs for Preadolescent Youth

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Abstract

Preadolescent youth make up the greatest proportion of virtual world users when compared to any other age group. Virtual worlds are becoming an additional environment—like school, home, and the mall—where preadolescent youth can learn, play, and socialize with friends. However, much of the literature about designing and understanding virtual worlds has been focused on the adult perspective, overlooking the unique developmental considerations of preadolescent youth. In addition, much of the current examination of virtual worlds for youth is done from a marketing and commercial perspective, highlighting ways to encourage monetary spending within them. The focus of these examinations is often on stand-alone virtual worlds, not those situated within programs at a school, an after-school setting, or a nonprofit organization.

This dissertation examines virtual world programs, using supporting data from a program called ClubZora, to understand the unique considerations of virtual world programs for preadolescents. ClubZora was an eleven-month pilot intervention aimed at bringing Zora, virtual world software, into the Intel Computer Clubhouse Network. Over 550 youth and adult Coordinators and mentors involved in this international afterschool organization enrolled in the project. While interacting with the virtual world software, participants built a virtual city, populating it with a variety of objects. Overall, participants logged in over 9,800 times, spent 430 hours in Zora, created more than 52,000 objects, and recorded over 35,000 lines of chat.

Using the methodological approaches of design-based research and program evaluation, this dissertation presents a framework comprised of seven attributes—purpose, communication, participation, play, artifacts, policies, and mentorship—for the design and evaluation of virtual world programs for preadolescent youth. For each attribute, specific program design recommendations are provided and implementation and outcome evaluation approaches are discussed. In addition, a case study of the application of the framework to the ClubZora project is provided. Finally, the limitations of the study and opportunities for future research are discussed. Virtual worlds are best considered in the context of programs in order to support preadolescent development, and the seven-attribute framework presented in this dissertation should be used in order to properly design and evaluate such virtual world programs.

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Chapter 1: Introduction, Problem Statement, and Research Questions

This dissertation presents a study of an international after-school organization in which virtual world software, called Zora, was used. The results of this study, a framework comprised of seven attributes—purpose, communication, participation, play, artifacts, policies, and mentorship—guide the design and evaluation of virtual world programs for preadolescent youth. This first chapter describes the motivation for this study, the background to the study, the problem statement, and the research questions and goals that informed the study.

Motivation for the Study

For the last nine years, I have been a part of the Developmental Technologies (DevTech) Research Group at the Eliot-Pearson Department of Child Development at Tufts University, first as an undergraduate student, then as a master's student, and finally as a doctoral student. Directed by Professor Marina Bers, the aims of the DevTech Research Group are to:

> understand how new technologies can play a positive role in children's development and learning. Our research involves three dimensions: theoretical contributions, design of new technologies, and empirical work with populations to test and evaluate the theory and the technologies. Developmental technologies are computational tools and technologically-rich interventions purposefully designed and used with the goal of supporting young people in their developmental quest. (DevTech Research Group, 2010)

I include this description of the mission of the group in order to highlight its focus on developmental technologies, not just technology in general. While in the DevTech Research Group, I also worked at the Center for Engineering Education Outreach (CEEO) during my master's program. With these two groups, I have had the opportunity to work with very young children and their parents in creating LEGO robotic structures that reflected their culture, with first-grade students as they were introduced to engineering through LEGO robotics, with post-transplant pediatric patients in a virtual world, and with youth from an international afterschool program in a virtual world. All of these experiences, in addition to my coursework, have helped shape a core set of personal beliefs about technology and how it relates to children.

First, at the foundation, is a firm belief in the importance of research-practice integration, a mantra of Eliot-Pearson. Research and practice should be intrinsically linked as each influences the other. Furthermore, I believe in the importance, and power, of applied research. Working with a variety of populations in a range of settings allowed me to grasp how rewarding and important—and difficult—applied, in-the-field research can be.

Second, I believe that technology, when designed appropriately, can be a means to support children's development. However, I also believe technology must be implemented in the context of a well-planned program, as Fishman, Marx, Blumenfeld, Krajcik, and Soloway (2004) wrote "researchers have long understood that for technology to contribute to learning requires much more than simply installing it in schools" (p. 44).[1] For example, one cannot assume that just by giving teenagers a video camera that they will "magically" produce video narratives about a societal issue as a means for them to understand their personal morals and beliefs, which in turn is a reflection of search for identity (a key developmental task of that age). Instead, the technology needs to be introduced in the context of a program, one that has been designed after considering a variety of issues; for example, what curriculum and resources will be used in order to help students understand what exactly a narrative is? Does the school have computers that are capable of supporting video editing? Who will teach the students about the technical aspects of video-production—the teacher? A guest? Furthermore, I believe that technology should not be used just for the sake of using technology; rather, it should be used in situations in which the learning experience can be enhanced and improved by its use, because with the inclusion of technology comes a variety of new challenges.

Third, as the use of developmental technology with youth is a relatively new concept when compared to the field of child development as a whole, there is currently opportunity to develop innovative methods of research in order to better understand these new experiences. These research methods can both be modifications of existing traditional methods (e.g., how to conduct focus group interviews in a virtual space) or can be completely new (i.e., the tracking of

[1] See also: Roschelle, J. M., Pea, R. D., Hoadley, C. M., Gordin, D. N., & Means, B. M. (2000). Changing how and what children learn in school with computer-based technologies. *The Future of Children, 10*(2), 76–101.

participants' locations in virtual spaces or the use of an online coding system for recording real-time observations[2]).

Fourth, I believe that research that crosses disciplines has the potential to inform aspects of our understanding of child development that may not have been considered previously. I have studied both engineering and child development, and I believe that my experiences in these two seemingly disparate fields have allowed me to act as a "bridge" between the "world of technology" and the "world of child development." Interdisciplinary research is important, as children's life experiences do not reflect just one field, but rather a combination of many, and therefore research about children's development should as well.

This dissertation study reflects these four beliefs—it is a cross-disciplinary study (the research) in an applied setting, with a developmental technology (virtual worlds) in the context of a program, using innovative research methods. The result of the study (the practice) is a framework for understanding how to design and evaluate virtual world programs; it is this research-practice integration that has guided my own development as a researcher.

Problem Statement

Richard Bartle, considered by some to be the "father" of virtual worlds, in his book *The Design of Virtual Worlds* (2004), came to the following conclusions after examining a variety of viewpoints about virtual worlds:

- *Virtual worlds are a meaningful object of study.*

[2] This was the focus of my master's thesis, in which I developed a web-based platform for real-time observation and coding of the behaviors and actions of first-grade students as they learned engineering with LEGO robotics.

- *Most of those research fields that look at virtual worlds do so with respect.*
- *Virtual world designers can learn much from researchers in other fields and vice versa.*
- *No existing field of research entirely subsumes virtual worlds.*
- *Virtual world design in particular is not covered elsewhere.*

> *The study of virtual worlds is a valid academic objective for its own sake, in the same way that the study of literature, film, theatre, or any other art form is valid. People who look at virtual worlds professionally need feel no shame for doing so; they can hold their heads up high. The stigmatization of virtual worlds as "just games" or "just simulations" or "just services" or "just a medium" is over. Virtual worlds are—virtual worlds! Rejoice in it!* (p. 370)

It is in this spirit, motivated by my set of four core beliefs, that I pursued this study of virtual worlds.

However, insomuch as virtual worlds have been examined—how to define them, how to design technological platforms to support them, and how to analyze them in terms of usability and desired outcomes—most of this research focuses on *adult* virtual worlds, ignoring the unique personal, social, and cognitive considerations of virtual worlds for *children*. Thus, while some of the previous research about adult virtual worlds may be applicable, much is not, as it lacks a developmental lens.

In the face-to-face world, environments for children, such as homes, schools, and playgrounds, are designed to accommodate their particular developmental level and age. For example, in homes with toddlers, parents install locks on the cabinets under the sinks with the cleaning supplies, cover the electrical outlets, erect baby gates to prevent access to unsafe rooms or stairs, and provide board books, blocks, make-believe costumes, and plush toys. Fast forward several years and parents may lock the cabinet containing the alcohol, require weekly chores, set rules regarding the completion of homework, and enforce an 11pm curfew. Schools are also designed for different ages of children—a preschool classroom looks very different from an elementary school classroom, which looks different from a middle school classroom, which looks different from a high school classroom. Playgrounds too are designed to be best for the age they are meant to serve. People also respond to children differently at different ages; for example, illustrated in the way that parents talk to their children based on their age—mothers often speak to infants in *motherese*, a special exaggerated form of speaking that teaches babies how to participate in conversation, whereas that same mother would be able to talk to her teenage son in adult-like language.

In the same way that much research regarding understanding how classrooms and playgrounds should be designed so as to be developmentally appropriate[3] has been completed, research regarding understanding how virtual worlds should be designed to be developmentally appropriate should also be undertaken. As Subrahmanyam and Greenfield (2008) wrote:

> Virtual worlds are becoming just one more environment of which children today are part. For today's youth, media technologies are an important social variable and . . . physical and virtual worlds are psychologically connected; consequently, *the virtual world serves as a playing ground for developmental issues from the physical world* [emphasis added]. . ." (p. 124).

As will be described in more detail in the next chapter, it is estimated that in just three years, over half of the children who are online will be involved in virtual worlds, resulting in many children for whom virtual worlds can provide an important environment for the development of their social, emotional, and cognitive skills, just as classrooms and playgrounds do.

In the field of child development, numerous theorists, scholars, and researchers examine how children grow into adults. In general, most of this work falls under one of three very broad but important aspects of childhood: social, emotional, and cognitive (intellectual) development. These three areas are not mutually exclusive, however, as each usually informs growth and development in

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[3] I want to acknowledge that I recognize the term *developmentally appropriate* is one that is hotly debated, especially when combined with the words "practice" or "care" in the context of early childhood education. For this dissertation, I use the term as defined in the National Association for the Education of Young Children's position statement on Developmentally Appropriate Practice (2009): "Practice that promotes young children's optimal learning and development" (p. 16). While their position statement was written for those who work with young children, I believe this broad definition can apply to children of all ages. See also a recent article in the journal American Educator (Willingham, 2008) regarding this issue.

the others. In addition, within the field, there is often disagreement amongst theorists about different aspects of development; for example, attachment to caregivers can be examined from Freud's drive-reduction explanation, Erik Erikson's psychosocial explanation, or John Bowlby's ethological explanation (Cole & Cole, 2001). This dissertation will examine examples of developmental theories as they relate to the various aspects of designing developmentally appropriate virtual worlds for preadolescents.

Currently, very few researchers have examined how to design virtual world software and corresponding programs in a way that supports the cognitive, social, and emotional development of children. In addition, there is little research regarding how programs implementing virtual worlds as tools can be evaluated. Using child development research and traditional evaluation methods as a foundation, I aim in this dissertation to provide a framework for the design and evaluation of virtual world programs for children.

Research Questions

An organization—for example, an afterschool program, an academic research lab, or a software company—desiring to create a program that uses a virtual world software as a tool for achievement of the program's goals should do so using two general principles: (1) Design the software being used and the intervention program using the software in a way that is appropriate to the age and developmental level of the intended audience, and (2) Evaluate the software and the program both for process—how the program was implemented—and for outcomes—how the program met the planned goals and intended impacts. These two principles provide the motivation for the two research questions of this dissertation:

(1) *How can virtual world programs be designed to support the personal, social, and cognitive development of preadolescents?*

(2) How can virtual world programs for preadolescents be evaluated in order to understand both the process by which the program is implemented and the outcomes achieved by the program?

Drawing on design-based research and program evaluation for the methods of this study, I developed a framework of seven attributes—purpose, communication, participation, play, artifacts, policies, and mentorship—in order to address these two research questions.

Professional Significance of Study

I envision three intended audiences for the framework set forth in this dissertation: (1) other university researchers working with virtual world programs; (2) staff who would like to incorporate virtual world software into a program within a non-university organization that serves children, such as a school, after-school program, etc.; and (3) designers of virtual world software for children. For the first audience, researchers in academic settings, this work would highlight methods to be used in developing, implementing, and researching virtual worlds for children. For the second audience, staff at non-university organizations, this work would help guide the development and implementation of a program using a virtual world. For the third audience, software designers, this work would introduce them to basic child development theory and allow them to better understand how to design software that is appropriate for the development of children.

My aspiration for this dissertation study is that members of those intended audiences will gain an appreciation of child development theory as it can be applied to the design and evaluation of virtual world programs for youth. Therefore, the long-term goals for this dissertation study will be:

(1) To provide people wishing to develop virtual world programs who are unfamiliar with child development research and theories an introduction to these concepts in order that they may gain a better appreciation of children’s development and how to incorporate these concepts into their work.

(2) To provide a framework for the design and evaluation of virtual world programs that support children’s cognitive, social, and emotional development.

Structure of the Dissertation

This dissertation is organized into eight chapters. In this chapter, I have provided the motivation for the study, the problem statement, the research questions, and the professional significance. In Chapter 2, I examine the current literature in three areas: (1) technology and Internet use by youth, (2) virtual worlds (including an example of a virtual world program that provided the background to this study), and (3) preadolescent development. In Chapter 3, I describe the context of the study and the procedures employed. In Chapter 4, I address the results of the study—the seven-attribute framework—by providing definitions of each of the attributes and their connection to preadolescent development. In Chapter 5 and 6, I discuss the design and evaluation of virtual world programs using this framework. In Chapter 7, I apply the attribute framework to a virtual world program. Finally, in Chapter 8, I provide the limitations of and future directions for the study.

Chapter 2: Literature Review

> *From virtual penguins to video games, there are a plethora of digital products on the market that target a new generation of digital natives—children growing up immersed in media that shape the way they live and learn. Today's children confidently roam rich virtual worlds, competently create content to share with their online peers, and easily navigate strategic video games via wireless, motion-sensing controllers. Experts have documented and parents believe that the new interactive media developed largely in the past decade represent a vital opportunity to leverage children's interests to expand their skills and knowledge, but major concerns with the current market's overall quality, developmental appropriateness, and educational value persist. (Shuler, 2007, p. 6)*

Technology, Internet, and Virtual World Use by Youth[4]

The above quote, from a 2007 report from the Jean Ganz Cooney Center at Sesame Workshop called *D is for Digital*, highlights the growing influence that digital media has on today's youth. Before embarking on a discussion of one of the technologies mentioned in that excerpt—virtual worlds—it is important to understand the context of children's lives in relation to technology.

In 2010, the Kaiser Family Foundation released its third report regarding media in the lives of 8- to 18-year-olds.[5] In this report, they found that "today the

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[4] This section was adapted from the previously published article: Beals, L., & Bers, M. U. (2009). A developmental lens for designing virtual worlds for children and youth. *The International Journal of Learning and Media, 1*(1), 51–65.

typical 8- to 18-year-old's home contains an average of 3.8 TVs, 2.8 DVD or VCR players, 1 digital video recorder, 2.2 CD players, 2.5 radios, 2 computers, and 2.3 console video game players" (Rideout, Foehr, & Roberts, 2010, January, p. 9). In addition, they report:

> The proportion of 8- to 18-year-olds owning a laptop has climbed from 12% to 29%; cell phone ownership has jumped from 39% to 66%, and those with an iPod or other MP3 player has gone from 18% to 76%. We suspect that the tremendous increase in cell phone and MP3 ownership among tweens and teens is probably the most important factor underlying the increase in media use among 8- to 18-year-olds. (p. 10)

Furthermore, the foudation reports that on average, youth spend almost 7 hours and 38 minutes a day consuming media (an increase from 6 hours 21 minutes), and in this time, youth manage to access 10 hours and 45 minutes of media content due to multitasking. A 2007 report by the Pew Internet and American Life Project (Lenhart, Madden, Macgill, & Smith, 2007) revealed that "more [Americans between the ages of 12 and 17 years] than ever are treating [the Internet] as a venue for social interaction—a place where they can share creations, tell stories, and interact with others" (p. i). In addition, Lenhart et al. (2007) report that 55% of online teens (ages 12 to 17 years) have a profile on a social networking site (e.g., Facebook or MySpace). A November 2008 report by eMarketer estimated that in 2009, 36.8 million or 59.1% of the population of children and teens (ages 3 to 17) would be Internet users, with over 39.7 million

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[5] Their previous reports were published in 2000 and 2005, therefore they are able to examine and reflect on changes in media usage by children over time. See http://www.kff.org/entmedia/8010.cfm for additional information.

(62.8%) by 2012 (Williamson, 2008a). Furthermore, Williamson (2008a) reports that of the total US Internet users in 2008, 15.6 million (8.1%) were children between the ages of 3 and 11 years and 20.2 million (10.5%) were between the ages of 12 and 17 years. In addition, Williamson (2008a) estimated that in 2009 82% of teens (ages 12 to 17) and 43.5% of children (ages 3 to 11) would use the Internet on a monthly basis.

In a 2009 report from the Pew Internet and American Life Project, Jones and Fox (2009) report that teens and “Generation Y” (ages 18 to 32 years) Internet users are the most likely groups to

- use the Internet for entertainment and for communicating with friends and family;
- seek entertainment through online videos, online games, and virtual worlds
- download music to listen to later;
- read other people’s blogs and write their own;
- use social networking sites and create profiles on those sites;
- use personal blogs to update friends on their lives;
- use social networking sites to keep track of and communicate with friends;
- send instant messages to friends. (p. 3)

In addition, 78% of Internet users ages 12 to 17 play games online, the most popular activity, as compared to 50% of Generation Y users.

More recently, some key findings regarding gadgets, Internet use, and social network use in a 2010 report from the Pew Internet and American Life Project (Lenhart, Purcell, Smith, & Zickuhr, 2010, February) highlight the prevlance of technology in children's lives. These findings are summarized below:

- *Gadgets*
  - The average youth owned 3.5 out of the following five gadgets: cell phones, mp3 players, computers, game consoles, and portable gaming devices. More specifically, 69% of youth have a computer (73% of 14- to 17-year-olds as compared to 60% of 12- and 13-year-olds), 79% of youth have an mp3 player, and 80% have a game console, such as a Wii, Xbox, or PlayStation.
  - Seventy-five percent of youth (12 to 17 years) have a cell phone (58% of 12-year-olds, 73% of 13-year-olds, and 83% of 17-year-olds).
- *Internet Use*
  - Three-quarters (76%) of families with children (12 to 17 years) have access to broadband Internet at home, an increase from 2004 (50%) and 2008 (71%).
  - Youth ages 12 to 17 are more likely to use the Internet than adults (93% versus 74%, respectively). While youth of both genders are equally likely to use the Internet, age is a factor in Internet use, albeit a small one: 88% of younger youth (12 to 13 years) go

online (83% of 12-year-olds and 92% of 13-year-olds), compared to 95% of older youth (14 to 17 years).

- "Nearly two-thirds of teen internet users (63%) go online every day—36% of teens go online several times a day and 27% go online about once a day. More than one quarter (26%) of teens go online weekly and 11% go online less often than that, patterns that have been in place since November 2006" (Lenhart, Purcell, Smith, & Zickuhr, 2010, p. 7). Younger youth (12 to 13 years) use the Internet less frequently than older youth.
- Though the computer was the most common way to go online, youth also used their cell phones, game consoles, or portable gaming devices.

▪ *Social Network Use*

- Almost three-quarters of youth (12 to 17 years) used an online social network website, as compared to 55% in November 2006 and 65% in February, 2008.
- Older youth (14 to 17 years) use social network sites more than younger youth (12 to 13 years), 82% versus 46% of 12-year-olds and 62% of 13-year-olds (though they hypothesize this difference is due to the age restrictions on the sites themselves).

From these statistics, it is clear that children's use of Internet and technology, of which virtual worlds are just one component, has increased steadily over the past few years, indicating the need for researchers to understand the effect these new technologies will have on children's development.

Defining key terms. Before going much further into a discussion of virtual worlds, however, I would like to define a few key terms. First, I would like to acknowledge that often the term *virtual community* is used in reference to work of this nature and sometimes is used interchangeably with the term *virtual world*, though I argue that they are in fact different.[6] The term *virtual community* does not have a universally accepted definition in the research literature; Preece (2001) wrote of this situation: "The terms mean different things to different people. For some, the concept creates fuzzy, warm, reassuring feelings; for others it conjures up concern about people operating at the margins of society to create networks of hatred or support for deviant behavior" (pp. 347-348).

However, one commonly used definition of the term *virtual community* comes from Howard Rheingold, who in 1993 wrote a pioneering book titled *The Virtual Community: Homesteading on the Electronic Frontier* based on his experience in an early text-based virtual community called the WELL (Whole Earth 'Lectronic Link). According to Rheingold, virtual communities are "social aggregations that emerge from the Net when enough people carry on those public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace" (1993, p. 5). More recently, Barab, MaKinster, and Scheckler (2004) described virtual communities as "a persistent, sustained social

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[6] I did not distinguish these two terms in this manner in my previous work, including in Beals and Bers (2009). It was only after publication of that work and lengthy contemplation on the terms that I determined that for the purposes of the work presented in this dissertation, these terms meant two very different things.

network of individuals who share and develop an overlapping knowledge base, set of beliefs, values, history, and experiences focused on a common practice and/or mutual enterprise” (p. 55). It is to this latter definition of *virtual communities* that I refer when I use the term throughout this work.

Virtual worlds are not necessarily virtual communities and vice versa, though as described below, the technology of virtual worlds grew from text-based virtual community environments. I argue that virtual worlds *are a specific type of technology with which a virtual community can be formed*. Virtual worlds are most broadly defined as computer-based simulated environments (Association of Virtual Worlds, 2008). In Chapter 4 of this dissertation I will suggest that the development of a virtual community could be a specific *purpose* of a virtual world program for youth, but as I believe these two terms to be very different, they are not interchangeable in this work.

In this dissertation, I define *virtual world* using the same definition as a May 2009 report by eMarketer:

> Virtual worlds are sites and applications that provide users with an online environment for interaction and socialization, typically through customizable avatars. Virtual worlds may include games, but are not games themselves. Typically, the virtual world is a graphically rendered 2-D or 3-D environment. Virtual worlds are distinct from massively multiplayer online games (MMOGs) such as World of Warcraft and from social network sites such as Facebook or MySpace. (Williamson, 2009, p. 2)

I believe that this definition is the most accurate as it separates virtual worlds from games and social networks. However, I want to elaborate on the difference between virtual worlds and games, as the difference between the two can be a confusing concept. Richard Bartle, creator of one of the first virtual worlds and author of the book *Designing Virtual Worlds* writes:

> Most certainly of all, virtual worlds are not games. Even the ones written to *be* games aren't games. People can play games *in* them, sure, and they can be set up to that end, but this merely makes them venues. The Pasadena Rose Bowl is a stadium, not a game.
>
> Virtual worlds are *places*. They may simulate abstractions of reality; they may be operated as a service; creating them may be an art; people may visit them to play games. Ultimately, though, they're just a set of locations. Places. (2004, p. 282)

The key point of his statement is that virtual worlds, while they can have games within them, are they themselves not games. This is an important consideration when designing virtual worlds for youth, as will be addressed in Chapter 5.

This definition of virtual worlds also refers to an important graphical component. As described in the above definition, current graphical virtual worlds, such as Second Life, are often 3D, and allow users to move around the environment and interact with other avatars. This dissertation focuses on these graphical, often 3D, worlds. However, this definition describes today’s virtual worlds; a brief overview of the history of virtual environments provides background to their current state.

The historical development of virtual worlds.[7] The first phase of electronic virtual connections between people began almost forty years ago. In 1972, ARPANET (U.S. Department of Defense's *Advanced Research Projects Agency*) developed email, which at the time was limited to "point-to-point" communication—one person to another. At this very beginning of interconnected computers, J.C.R. Licklider and Robert Taylor, research directors for ARPA, remarked, "What will on-line interactive communities be like? In most fields they will consist of geographically separated members, sometimes grouped in small clusters and sometimes working individually. They will be communities not of common location, but of common interest . . ." (1968, pp. 37-38). This definition, then, was one of the first to take away the "place" component of traditional definitions of the term *community*, allowing for the possibility of community formation not bounded by geography.

Three years later, listservers, which allowed one person to email many others, were developed. Also during this time virtual bulletin boards, based on a metaphor of a physical bulletin board, were developed, allowing people to post messages to groups and receive replies based on their posts ("threads"). The above are examples of asynchronous communication technologies in which the people communicating do not have to be co-present in time (Preece, Maloney-Krichmar, & Abras, 2003). Synchronous communication, communication that occurs when people are online at the same time, was developed in recent years. Examples of synchronous communication include chat systems and instant

[7] A lengthy history of virtual worlds can be found in Bartle, R. A. (2004). *Designing virtual worlds*. Indianapolis, IN: New Riders Publishing.

messaging (e.g., Internet Relay Chat, ICQ, America Online's Instant Messenger, Google's gChat). The distinction between synchronous and asynchronous communication is an import facet of the design of virtual worlds that will be explored in more detail in Chapter 5.

In 1979 and 1980, two of the most important and influential online community experiments, Usenet and MUDs (*Multi-User Domains*, once *Multi-User Dungeons*), began at two universities. In 1979, students of computer science at the University of North Carolina and Duke University devised a way in which the two communities could automatically exchange information; they called this system Usenet. A little over 10 years later, several million people in over forty countries were exchanging tens of millions of words daily on Usenet. Usenet enabled people to read and respond to conversations about various topics; however, all posts were public, instead of private, like email (Rheingold, 1993).

Roy Trubshaw and Richard Bartle at Essex University in the United Kingdom co-created the first MUD in 1978. MUDs combine elements of role-playing games and social chat rooms. The original MUDs were text-based, meaning that users created rooms, objects, events, other characters, and chat through detailed descriptions. Some have argued that current virtual worlds and games, such as World of Warcraft and Second Life, can trace their origins back to these original MUDs (Stuart, 2007, July 17).

In 1985, Stewart Brand and Larry Brilliant began the *Whole Earth 'Lectronic Link* (The WELL) as a dial-up bulletin board system. The WELL is one of the oldest virtual communities in continuous operation. The WELL is comprised of many different subject areas, such as arts, health, politics, etc., called conferences. Rheingold (1993) said of the WELL:

> There's always another mind there. It's like having the corner bar, complete with old buddies and delightful newcomers and new tools waiting to take home and fresh graffiti and letters, except instead of putting on my coat, shutting down the computer, and walking down to the corner, I just invoke my telecom program and there they are. It's a place. (p. 24)

From these text-based communities emerged today's graphical virtual worlds.

Popularity of virtual worlds for youth. The author of *D is for Digital* described a "consumer market trend" of children "flocking" to virtual worlds. In another report, *The Power of Pow! Wham! Children, Digital Media, & Our Nation's Future*, the authors reported that "several of the experts [who were interviewed for the report] . . . told us that neither they nor their colleagues had anticipated the extent of children's involvement in online social networking opportunities" (Shore, 2008, p. 11). Prescott (2007) reported that of the five top virtual worlds sites, four of them were youth focused and furthermore, were rated higher than adult-oriented equivalents such as *Second Life* and *World of Warcraft*. The Association of Virtual Worlds publishes a report entitled *The Blue Book: A Consumer Guide to Virtual Worlds* in which descriptions, links, and categories for current virtual worlds are provided (Association of Virtual Worlds, 2010, November). A count of these worlds reveals that approximately 170 are categorized as for children, 150 for tweens, and 190 for teens (some worlds, however, are designed for multiple age groups; for example, the categories kid/tween, tween/teen are often together).[8]

As an example of the increasing popularity of virtual worlds for children, the site Webkinz increased its visits by 1141% in a year (Prescott, 2007), from less than 1 million to over 6 million (Tiwari, 2007, May 10). Also over the course of a year, Club Penguin doubled in size, from 1.9 million to 4.7 million visitors (Shore, 2008). A 2009 eMarketer report indicated that between February 2008 and 2009, U.S. traffic to Club Penguin increased 12%, Zwinky increased 42%, and Poptropica increased 136% (Williamson, 2009). This popularity, however, for many of the sites is tied to commercial endeavors—for example, Club Penguin was acquired by Disney for $350 million (Barnes, 2007, August 2) and U.S. retail sales of the Webkinz dolls in 2006 earned $45 million (Tiwari, 2007, May 10). In addition, many of the most popular sites tie physical toys to the worlds—for example, the popular Webkinz animals or the Bratz fashion dolls, which are sold with a USB key disguised as a necklace that allows the buyer to unlock the Be-Bratz.com virtual world. As another example, BarbieGirls.com, owned by Mattel, registered four million users in the first three months after its launch, with an average of 45,000 new girls a day. Sherry Turkle, a professor and the director of the Initiative on Technology and Self at the Massachusetts Institute of Technology, said of this phenomenon in a recent *New York Times* interview regarding this surge in participation in virtual worlds: “For young people, there is

[8] The Association of Virtual Worlds publishes their *Blue Book* quite frequently; the most current version can be found on their website: http://www.associationofvirtualworlds.com/publication/the-blue-book/.

rather a kind of fluid boundary between the real and virtual world, and they can easily pass through it” (Richtel & Stone, 2007, June 6).

There are also popular virtual worlds with a less commercially-focused approach. For example, IBM and Zula USA, a children’s production company, have created a virtual world focusing around math, science, and technology, found at ZulaWorld.com (though still based on the children’s TV show Zula Patrol). Sesame Workshop, with Merrill Lynch and Company, have created a virtual world called Panwapa, which immerses children “in a unique and novel exploration of self, community and cultures from around the world” in order to “empower a new generation of children, ages four to seven, to be responsible global citizens” (Sesame Workshop, 2007). Other virtual worlds such as Quest Atlantis (Barab, Thomas, Dodge, Carteaux, & Tuzun, 2005), River City (Dede, Ketelhut, Clarke, Nelson, & Bowman, 2005; Dede, Nelson, Ketelhut, Clarke, & Bowman, 2004), Second Life in Education, MOOSE Crossing (Bruckman, 1996), Whyville, 3DLearn, Jumpstart, and Zora (Bers, Chau, Satoh, & Beals, 2007; Bers, Gonzalez-Heydrich, Raches, & DeMaso, 2001), are designed with the hope of engaging young people in learning and education. (See Appendix A for examples of other virtual worlds for children.)

From another perspective, KZero Worldswide (“Resident experts in virtual worlds”), a UK-based company aiming to understand “the marketing dynamics relating to virtual worlds,” examine the current state of virtual worlds by reporting on the total registered accounts on a quarterly basis. Figure 1 shows the expected growth of virtual worlds overall (including those for adults) through

2012. Figure 2 shows the current state of the "universe" of virtual worlds as of Quarter 3 of 2010 for the segment of users 10 to 15 years.

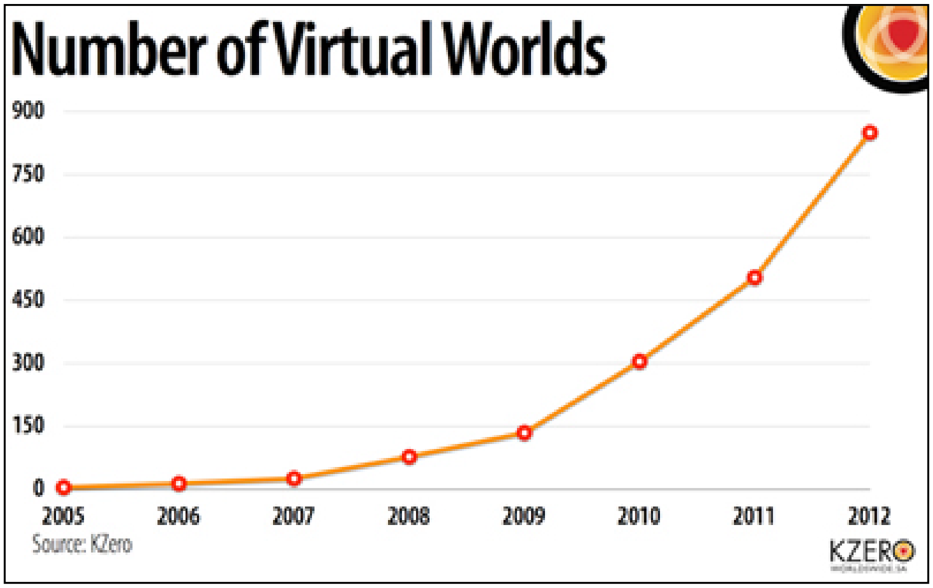

Figure 1. Industry forecast showing the growth of virtual worlds, 2005 – 2012. Adapted from "Industry forecasts: Number of virtual worlds," by KZero Worldswide, n.d., available from http://www.kzero.co.uk/industry-forecasts.php. Copyright by KZero Worldswide.

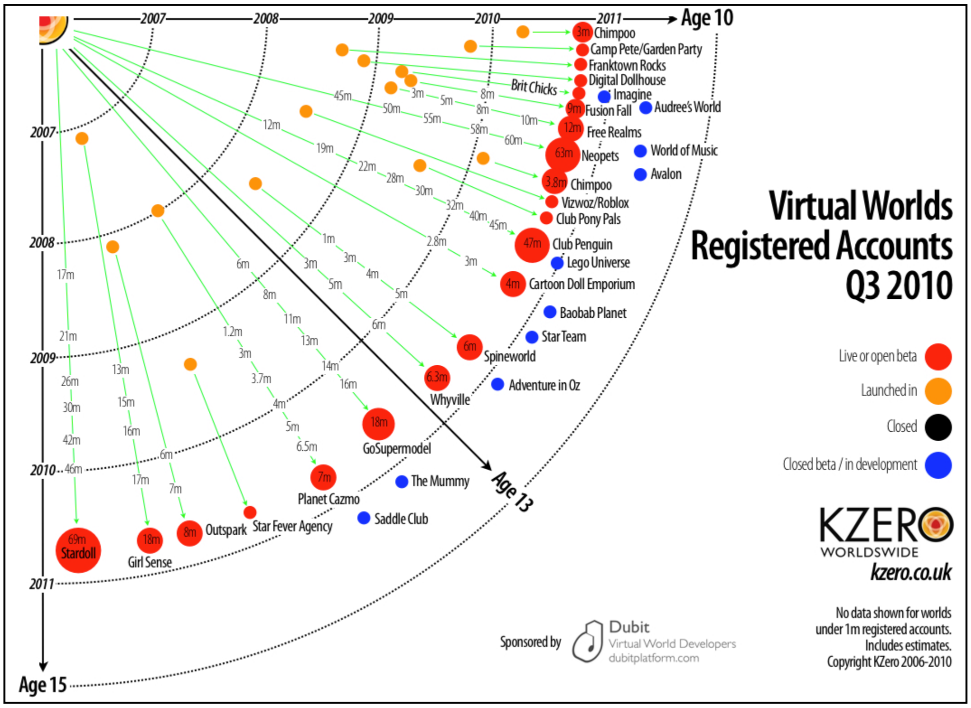

Figure 2. Virtual worlds registered accounts for Quarter 3 of 2010, for ages 10 to 15 years. Adapted from “Universe chart Q3 2010: 10 to 15 year olds,” by KZero Worldswide, September 2010, available from http://www.kzero.co.uk/blog/?p=4471. Copyright 2010 by KZero Worldswide.

KZero Worldswide’s 2010 Quarter 3 reports show that the largest virtual world for adults (over age 20), IMVU, has 57 million registered users, while the largest for children, Habbo, has 175 million users (with 36 additional worlds having over 1 million registered accounts), indicating just how large virtual worlds for children are in comparison to those for adults (KZero Worldswide, 2010a). As another example, since Quarter 2 of 2008 (KZero Research, 2008), Habbo has grown from 90 million registered accounts to over 175 million (KZero Worldswide, 2010a), while Second Life (a popular virtual world for adults) "only" grew from 13 million accounts (KZero Research, 2008) to 22 million (KZero Worldswide, 2010a). As another indication of the prevalence of virtual worlds for children, eMarketer reports that 37% of online children (ages 3 to 11 years) use virtual worlds at least once a month; this number is expected to increase to 54% by 2013 (Williamson, 2009). In comparison, 18% of online teens will use virtual worlds at least once a month, with an expected increase to 25% by 2013. A report by the market research firm Strategy Analytics describes a growth in virtual worlds users (all ages) from 186 million in early 2009 to almost 640 million by 2015, with a 27% increase in users ages 5 to 9 and a 21% increase for tweens and teens, currently the largest users of virtual worlds (Gilbert, 2009, June 1).

Table 1 shows detailed numbers of cumulative global unique virtual world registrants in 2009 and 2015.

Table 1

Forecast of the Cumulative Global Unique Virtual World Registrants (millions) in 2009 and 2015.

	2009	2015
Adult	11.5	32.5
Tween/Teen	125.0	395.6
Kids	50.0	209.9
Total	186.5	638.0

Note. Adapted from "Press release: Virtual worlds forecast to grow at 23% through 2015" by B. Gilbert, June 1 2009, available from http://www.strategyanalytics.com/default.aspx?mod=PresReleaseViewer&a0=4745.

There are currently virtual worlds available for children of all ages—from preschoolers to older teenagers. For this dissertation, however, I will be focusing on preadolescents—children ages 10 to 12. This choice of this age is for several reasons. First, Rideout et al. (Rideout et al., 2010, January) reported:

> The jump in media use that occurs when young people hit the 11- to 14-year-old age group is tremendous—an increase of more than three hours a day in time spent with media [to a total of 8 hours 40 minutes] and an increase of four hours a day in total media exposure [to a total of 12 hours]. (p. 5)

Thus in general, the exposure to technology and media for this age group increases significantly.

Second, according to several marketing reports, children of this age are, and will continue to be, the largest users of virtual worlds (KZero Worldswide, 2010b; Williamson, 2009). KZero Worldswide (2010, September) estimate that 46% of the total market (468 million of 1.009 billion users as of Quarter 3 of 2010) is comprised of virtual worlds with an average user age between 10 and 15 years. Furthermore, they state:

> This is both good news now, for companies with propositions targeting this group[9] and also extremely encouraging for the future of the sector—because these people will get older (obviously) and be well-versed and familiar with virtual worlds. The future success of the virtual worlds sector is in their hands. (KZero Worldswide, 2010b, p. 5)

[9] Commercialism in virtual worlds for children will be discussed briefly in Chapters 4 and 8.

Therefore, this work addresses the largest current—and future—user base for virtual worlds.

Third, the Zora virtual world software, which is discussed in detail in the next chapter, was designed for children ages 11 to 14. The two main research projects in which I was involved during my time as a doctoral student and member of the Developmental Technologies Research Group, called *Virtual Communities of Learning and Care at Children's Hospital Boston* and *ClubZora*, used this software, and these experiences formed the foundation upon which I developed my dissertation topic. Furthermore, one of these projects—ClubZora—will provide both qualitative and quantitative data to support my assertions throughout this dissertation.

In summarizing this immense interest in virtual worlds, Williamson (2009) wrote, "Virtual worlds reside in a sweet spot between online games (which are intensely popular among children) and social networking (similarly popular among teens)" (p. 2). Virtual worlds are clearly going to be an important component of the online experience of children.

The Development of Preadolescents: Key Developmental Tasks

The above sections describe the popularity of virtual worlds for youth, in particular for preadolescents. In examining this situation from a child development perspective, I ask: "Why are preadolescents flocking to virtual worlds?" and then, "If preadolescents are using virtual worlds in such earnest, how can virtual worlds be leveraged to support the development of preadolescence?" Therefore, in this next section, I will provide a brief overview of the development of preadolescents, focusing specially on the domains that are most relevant to virtual worlds—cognitive development and social development, the latter with an emphasis on peer groups. In Chapter 4, I will provide specific examples of preadolescent developmental tasks as they relate to virtual worlds; this section is meant to provide the background information necessary to understand this later discussion.

First, however, I would like to examine the term *preadolescent*. The *pre* aspect of the term implies in some ways that preadolescence is simply a time before adolescence—a time of preparation for the teenage years. In contrast, Freud (1920/1955) believed that this age was merely a latent period of older childhood—a time in which development was slowed in anticipation of adolescence. However, preadolescence is an important stage within itself and should not be seen merely as a “space” between childhood and adolescence. Important physical, social, and emotional development occurs during this stage, and therefore should be given consideration in its own right.

Alder and Alder (1998) in their book *Peer Power: Preadolescent Culture and Identity*, describe in detail the lives of preadolescents, based on eight years of insider participant observation. They describe key aspects of the lives of preadolescents, including popularity, cliques, after-school activities, friendships, and cross-gender relations. At the conclusion of their book, they provide some key observations of this age group:

> Preadolescence represents a liminal state between childhood and adolescence, between the safety and security of childhood and greater

> rewards and responsibilities of adolescence. Over the past several decades, we have witnessed the increasing "adolescentization" of society, as children have turned to adult pastimes and behavior at ever younger ages . . . Adult influences are reaching down into adolescence, and adolescent influences into preadolescence. . . . Yet preadolescents are still trapped in the social cage of the family and the classroom, still defined by needing the care of babysitters. They find themselves buffeted by conflicting influences . . . They represent the last age of childhood, where we see the beginning emergence of peer identity, social preferences, and the roots of adolescent behavior patterns. (p. 200)

Elkind (1981/2001) also commented on this acceleration of childhood in *The Hurried Child: Growing Up Too Fast Too Soon*, in which he describes the ways in which children today are no longer able to "just be" children, but are instead expected to assume adult-like behaviors at earlier-and-earlier ages.

Unfortunately, this notion of preadolescence as a time before adolescence is mirrored in the other more mainstream terms for this age—*preteen* and *tween*. Cook and Kaiser (2004) describe the development of these terms, which stemmed from a consumer and marketing movement around clothing and fashion for this age. In particular, they describe the enormous buying power of preadolescents, and the very real, very large market comprised of these youth that companies aim to target; companies which are now embedding their advertising in virtual worlds. KZero Worldswide reports:

> As virtual worlds continue to attract new users, we expect greater perceived value to be created. By this, we're referring primarily to a greater acceptance from parents both to allow their children to play in virtual worlds and as important, an *increase in permitted spending* [emphasis added], approved by the parents. (KZero Worldswide, 2010b, p. 3)

Furthermore, in describing the movement towards using cell phones (SMS transactions) as payment devices, they write:

> This payment mechanic has benefits in several areas. *Firstly, many younger users are given pre-paid phones, meaning their parents are less likely to monitor their usage* [emphasis added]. The result here is that these users are more able to purchase virtual currencies/goods. Secondly, the actual process of purchasing is significantly easier with phones than credit cards - typically a five-digit code is sufficient to activate a transaction. (KZero Worldswide, 2010b, p. 3)

What does this all mean, then, for virtual worlds? I believe there are several important considerations.

First, preadolescence should be considered its own stage in development—youth of this age should not be considered children nor should they be considered teenagers. Instead, they should be understood within their own frame and virtual worlds should be designed to support this unique time period. However, certain developmental limitations, in particular cognitively, allow youth to be vulnerable to manipulation through marketing, which is also found in virtual worlds.

Second, following this, companies have already been savvy enough to notice that this age group has tremendous buying power, and they are extending this knowledge into the medium of virtual worlds. However, youth of this age often do not recognize advertising as such; Wollslager (2009) found that only 23% of fourth and fifth-grade youth were able to understand that branded games within Neopets were a form of advertising. Calvert describes this as “stealth marketing:”

> The theory behind the new technique is that advertising is most effective when consumers do not recognize it as advertising. If consumers’ “guards” are down, they will be more open to persuasive arguments about the product. Using this approach, marketers try to blur the line between the advertisement and the content. (Calvert, 2008, p. 208)

Most of this advertising occurs in what I am dubbing “stand-alone” virtual worlds, as they often have a inherently commercial purpose, while virtual world programs, as I see them, have a place in more “academic-focused” situations, such as schools and after-school organizations. (I will discuss in more detail my distinction between stand-alone virtual worlds and virtual world programs in a later section of this chapter.) Unfortunately a complete discussion of the role of marketing and advertising in virtual worlds (and in the larger online experience), is beyond the scope of this work. I present it, though, however briefly, in order to acknowledge this potential "danger" of virtual worlds; this is also addressed as an area of future work in Chapter 8.

In returning to the core of this section—preadolescent development—I will now examine briefly preadolescents' cognitive, language, and social development, as these are the areas most related to virtual worlds and hence this work. The aim of this overview is to give a sense of what development of a preadolescent "looks like" in key areas that relate to virtual worlds, as it is estimated that of the total virtual world market (1.009 billion), 46% are users between the ages of 10 and 15 years (KZero Worldswide, 2010, September), and thus the largest users of this technology. I acknowledge that a discussion of all facets of development of youth in this stage is not within the scope of this dissertation.

Cognitive development. At the biological level, there are important brain changes that allow for cognitive development during this time. These changes include myelination of the front cortex, which speeds up conduction of nerve impulses; synaptic pruning and stabilizing; increasing alpha activity (engaged attention); increasing white matter, especially in the frontal lobe; increasing hormone secretion, in particular of androgens; and increasing EEG coherence, coordination of the systems of the brain (Berk, 2008, 2009; Lightfoot, Cole, & Cole, 2009). These changes permit "the frontal lobes to coordinate the activities of other brain centers in a more complex way, enabling children to better control their attention, solve complex problems, form explicit plans, and engage in self-reflection" (Lightfoot et al., 2009, p. 393).

Among the many theories of cognitive development, I chose to focus on the work of Piaget, as it is one of the most well-known theories. However, I would like to note that Piaget's theory is presented here not as *the* way to understand cognitive development, but as an example of how child development research and theory can help designers of virtual worlds for youth understand better how to create technology that supports real-life development. Throughout the rest of this dissertation, the same sentiment is true for the other work presented—each is only an example of how child development research can inform the design and understanding of virtual worlds.

Briefly, Piaget's cognitive-developmental theory is based on the idea that development occurs in four stages—sensorimotor, preoperational, concrete operational, and formal operational. These stages provide a general theory of development, they are invariant (one most proceed through the stages in order, and no stage can be skipped), and they are universal (they apply to all children everywhere) (Berk, 2009; Piaget, 1923/1926, 1929/1951; Piaget & Inhelder, 1969). Children move through the stages via adaptation (devising schemes—organized understandings of experience—by interacting with one's environment), which is comprised of assimilation (use of current schemes) and accommodation (the creation of new schemes). Piaget's theory is considered constructivist, as the foundation of the theory is that their interactions with and manipulations of the world is the means by which children construct their knowledge.

Preadolescence spans two of Piaget's stages: concrete operational stage (7 to 11 years) and formal operational stage (12 years and older). In the concrete operational stage, children's thought is more logical, flexible, and organized then in the previous preoperational stage. Children gain the ability to understand conservation tasks (including decentration, the ability to focus on more than one aspect of a task, and reversibility, the ability to think through a series of logical steps and then think backwards to the starting point), comprehend classification hierarchies, and seriate (including mental seriation) (Berk, 2009; Piaget & Inhelder, 1969). In formal operations, children are capable of thinking systematically and logically about a problem, as they develop hypothetical-deductive reasoning. Of this stage Piaget wrote (Piaget & Inhelder, 1969) "the subject succeeds in freeing himself from the concrete and in locating reality within a group of possible transformations" (p. 130).

Important to virtual worlds are two changes during these stages: (1) the improvement of spatial reasoning, which includes the ability to give directions and to draw and read maps (Liben, 1999), and (2) a decrease in egocentrism, which allows children to communicate about objects that others cannot see and to consider the perspectives of another. Because preadolescents develop this latter ability, (i.e., to understand the roles of the players in the game), rule-orientated games become common among preadolescents (Berk, 2008).

Language development. Developmentally, language serves many important purposes. The study of language development is a field unto itself and thus beyond the scope of this dissertation. However, a brief overview of a few of the major theories will help elucidate the importance of language learning in childhood. From an environmental-learning perspective, children learn language by relating what they hear to what is going on in the world around them. Language is a means to communicate with others, but more importantly, language allows for a greater understanding of the world, and thus a higher form of thinking (Bandura, 1986; Skinner, 1957). Piaget (1926; 1983) believed that the ability to think symbolically, which occurs at the end of infancy, allows for language development. In this perspective, however, language reflects thought, but thought is not influenced by language. From a nativist perspective, Chomsky (1980) believed that humans have a unique “language acquisition device” (LAD) that is a self-contained mental module, and thus language and thought do not depend on each other. From a cultural-context perspective, Vygotsky (1934/1987; 1978) believed that the experience of learning language is a social one, in that words are communicative acts, allowing for exchange with others. Vygotsky believed that around the age of 2 years, language and thought become intertwined (as opposed to developing independently in the previous years), allowing for the uniquely human ability in which “language becomes intellectual and thinking becomes verbal” (Cole & Cole, 2001, p. 329). Thus, in general, most developmentalists believe that language and thought are important to each other; it is the specifics of *how* that causes much debate. Regardless of the theoretical perspective, though, language and communication are means to socialize with others, with the development of language allowing for participation in a community.

How does language development tie to virtual worlds? This will be discussed in more detail in Chapter 4, however, at a fundamental level, though most current virtual worlds are graphically-based, they often rely on text for communication (i.e., chat) and potentially for learning about the world and program (i.e., reading instructional materials). Therefore, a youth's ability to read and write inherently affects his or her ability to participate in the world by socializing with others (i.e., a youth who was unable to read or write could simply build objects and navigate through the world, but would unlikely be able to develop new friendships).

Social development. One of the basic premises of virtual world programs is their social nature—they are meant to be used by many youths at once. Therefore, virtual worlds can support the social development of preadolescents. During preadolescence, peer relations become an important context for development (Berk, 2008). In particular, youth of this age form peer groups, which are often organized based on similarities in sex, ethnicity, academic achievement, popularity, aggression, and proximity (Rubin, Bukowski, & Parker, 2006). Alder and Alder (1998) wrote:

> Preadolescent peer culture is a very powerful entity. The cement that bonds preadolescents, unifying their lives and their outlooks, it is something that desperately try to align themselves within. Even as they vocally assert their rights to be individuals, they herd together like sheep. . . . Two of the most powerful functions associated with preadolescent peer culture are its socializing effects and its influence on the way individuals construct their identities. (p. 207)

Therefore, creation of peer groups can have powerful affects on preadolescent social development.

How does this potentially influence youth's engagement with virtual worlds? I see two main areas of social development that could influence preadolescents' interactions with virtual worlds. First, popularity is an important aspect of preadolescence, and for boys, is determined by athletic ability, coolness, toughness, savior faire (sophistication in social and interpersonal skills); for girls, by family background (specifically socioeconomic status and permissiveness of parents), physical appearance, precocity (early attainment of adult social characteristics), exclusivity (formation of elite social groups), and academic performance (Alder & Alder, 1998). Many of these influences on popularity are tied to appearance in one way or another; virtual worlds potentially eliminate these factors as users are represented by avatars.

Second, during preadolescence, youth move from same-gender groupings to cross-gender groupings (Alder & Alder, 1998; Berk, 2009; Lightfoot et al., 2009). Calvert, Mahler, Zehnder, Jenkins, and Lee (2003) examined gender differences in preadolescents' online interactions in a MUD and found that youth often chose an avatar of their own biological sex, stating:

> The salience of gender for preadolescents, when children are just beginning to demonstrate interest in opposite sex peers, may be one reason for staying close to familiar roles. That is, when one is just beginning to think seriously about what it means to be a boy or a girl in relation to other people, it may feel safer to be yourself than to experiment. (p. 640)

Kafai, Fields, and Cook (2010) found “four main reasons that tweens gave for making their avatars the way they did: the pure aesthetics of a look, to embody some aspect of their ‘real’ selves, to align oneself with or against a popular trend, and for a functional reason like disguise” (p. 33–34). Virtual worlds can potentially offer a safe space for exploration of cross-gender interactions.

Subrahmanyam (2009) suggests, with caution, that perhaps preadolescents do not use virtual worlds for identity exploration, as do adolescents and adults, even though online identity exploration has been the focus of several researchers, including Sherry Turkle’s influential book on the subject, *Life on the Screen: Identity in the Age of the Internet* (Turkle, 1995). This is not surprising—unlike for adolescents, identity development is not a key task of preadolescence and thus why I have not included an extensive discussion of identity development in this work. However, it is important to note that the first step towards this quest for identity in adolescence is exploration, and this begins in childhood and preadolescence. Such exploration can potentially occur in virtual worlds; Kafai et al. (2010) suggest the term *identity playground* “to situate tweens’efforts at creating online identities” (p. 25). Furthermore, of the ability for preadolescents design their avatars, they write:

> Tween players [can] explore different looks and to engage in anticipatory behavior of someone older or of different gender. This aspect of avatar design has a more playful quality than what Turkle (1984, 1995) observed in her studies of adults using their online experiences to examine alternative aspects of their identity—their second self. Indeed, we would

> argue that tween players are not in search of the second self but are experimenting with second selves" (Kafai et al., 2010, p. 25).

Thus virtual worlds for preadolescents need to provide the means for identity exploration, for example, through the use of customizable avatars and personalizable objects, but do not necessarily need to make this a main priority in the design of the technology, as would be needed for virtual worlds for adolescents.

Though choice of sex and other basic physical characteristics may stay constant from the real to the virtual, virtual world programs have the potential to eliminate some of the physical-appearance barriers to the formation of peer groups, as youth's personas are "played" by avatars in the virtual world. A preadolescent's physical appearance is not apparent in the virtual world, and therefore he/she is free from normal judgment and stereotypes. Of course, this does not necessarily apply to virtual world programs which are designed for youth from similar proximity (i.e., a classroom or after-school program), but may apply for programs connecting youth from disparate geographic locations, such as the Virtual Communities of Learning and Care project, which will be described below.

Virtual Worlds in Context: Stand-Alone versus Program-Based

Most of the virtual worlds that are listed on the KZero reports and in the Association of Virtual Worlds *Blue Book*, are what I am dubbing "stand alone," in the sense that any child could find the virtual world on the Internet and request access—the world is not tied to or limited by a particular organization, such as a school or after-school organization. This dissertation focuses not on these “stand-alone” virtual worlds, but rather on virtual worlds that are incorporated as tools into programs for children. My hope is that organizations, using the information set forth in this dissertation about how to design and evaluate virtual world programs, can harness the popularity of virtual worlds in order to further their programs’ goals with children.

There are several programs currently available that do use virtual worlds as tools, including Indiana University’s *Quest Atlantis* (Barab, Thomas et al., 2005), Harvard University’s and Arizona State’s *River City* (Dede et al., 2005; Dede et al., 2004), Cornell University’s *SciCenter* and *SciFair* (Corbit, 2002; Corbit & Norton, 2007, November)[10] and Tufts University’s *Zora* (Bers et al., 2007; Bers et al., 2001). In addition, there are several virtual world programs for youth based in Second Life Education[11] and the Active Worlds Educational Universe[12]. In the first, virtual world programs for preadolescent youth include those of Global Kids[13] and Skoolaborate[14]. In the second, virtual worlds programs

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[10] Note: “When the SciCentr program was closed by Cornell University in June 2009, the ActiveWorlds universe and license, the worlds, programs and all associated content transferred to the Greater Southern Tier BOCES [Boards of Cooperative Educational Services]. EDUni-NY was born on July 1, 2009” (GST BOCES, 2010a). For more information, visit: http://www.eduni-ny.org.

[11] For more information about Second Life Education, visit http://lecs-static-secondlife-com.s3.amazonaws.com/work/SL-Edu-Brochure-010411.pdf.

[12] For more information about the Active Worlds Educational Universe, visit http://edu.activeworlds.com/.

[13] For more information about Global Kids in Second Life, see http://edudirectory.secondlife.com/listing/show/listing_id/150 and http://globalkids.org/#/our-programs/digital-media.

[14] For more information about Skoolaborate, see http://edudirectory.secondlife.com/listing/show/listing_id/181 and http://www.skoolaborate.com/.

for preadolescent youth include those of the Georgia O'Keeffe Middle School[15] and the Jordan Middle School[16].

Stand-alone virtual world example: Neopets. The most popular stand-alone virtual worlds for preadolescents is Neopets[17], a virtual pet site (Figure 3) that began in November of 1999 and is now owned by Nickelodeon.[18] In Neopets, users create a new Neopet, which includes choosing the Neopet's species, gender, and personality (on December 27, 2010, 269,242,963 Neopets had been created). Users can also choose to adopt a Neopet from the Neopet Pound. Users can communicate with each other via NeoMail, chat (NeoChat), and message boards. Children can also ask other users to become their "NeoFriends," to which the receiver can accept or refuse. In addition, there are "Guilds," groups of users with similar interests. Guilds have their own message boards and can be public or private. In Neopets, message boards are monitored 24 hours a day in addition to filters to help stop offensive messages from being posted. The *Terms and Conditions* page outlines what is expected of members in the community[19]; and the *Terms and Conditions Frequently Asked Questions*[20] page clarifies common questions for users.

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[15] For more information about Georgia O'Keeffe Middle School project in AWEdu, visit http://edu.activeworlds.com/participants/okeeffe.html.
[16] For more information about the Jordan Middle School project in AWEdu, visit http://edu.activeworlds.com/participants/stargate.html.
[17] For more information about Neopets, visit http://www.neopets.com/.
[18] For a detailed description of the experience of participating in Neopets, see: Lu, S. L. (2010). Growing Up with Neopets: A Personal Case-Study. *Journal of Virtual Worlds Research*, 3(2). Retrieved from https://journals.tdl.org/jvwr/article/view/1895/1164.
[19] The Neopets Terms and Conditions can be found at http://www.neopets.com/terms.phtml
[20] The Neopets Terms and Conditions Frequently Asked Questions can be found at http://www.neopets.com/termsfaq.phtml.

Figure 3. Screenshot of the Neopet virtual world for children.

In addition new users can easily outfit their Neopet from the several shops available within the community. Eventually, as a user becomes more skilled at navigating the world and the commerce policies, he or she can create a shop of his or her own in which he or she can sell items for Neopets to others. In order to make these shops, youth can learn how to program webpages in HTML using a step-by-step guide (Neopets, 2008). In addition, the site provides information about how to draw, either with paper-and-pencil or with a computer program, Neopets, Petpets, Chokatos, Faeries, and an assortment of characters. There are also contests in Neopets, such as poetry contests, in which children can submit original work. Users may also submit content for the weekly electronic newspaper called *The Neopian Times*.

There are many games to play in Neopets, such as Kacheek Seek, Turmac Roll, Dice-A-Roo, Sakhmet Solitaire and Faerie Bubbles. Playing the games will earn users points to be able to “buy” additional items for their Neopets. Users can also collect items to help care for their Neopets or sell to others. Users can also win badges for being guides to other users that showcase their competence and participation in the various aspects of the virtual world. Users can also use a “Traxmachine” to create music tracks, which can then be played on some types of furniture, on Jukeboxes, or they can be burned to a disc and mailed to the user.

Program-based virtual world example: Virtual Communities of Learning and Care at Children’s Hospital Boston.[21] In contrast to Neopets, one of the projects of the DevTech Research Group that used a virtual world software, Zora (to be discussed in detail in the next chapter), was called *Virtual Communities of Learning and Care at Children’s Hospital Boston* (VCLC). For this project, as a graduate research assistant, I worked as a team with two other graduate students. Specifically, I coordinated the patients, including enrollment and data collection. I also interacted online with the youth throughout the duration of the project. This was my first experience with a virtual world program; this experience provides the background to the study presented in this dissertation.

[21] This section was from two previously published articles:
(1) Bers, M. U., Beals, L. M., Chau, C. S., K., Blume, E. D., DeMaso, D. R., & Gonzalez-Heydrich, G. (2010). Use of a virtual community as a psychosocial support system in pediatric transplantation. *Pediatric Transplantation, 14,* 261-267.
(2) Bers, M., Beals, L., Chau, C., Satoh, K., & Khan, N. (2010). Virtual Worlds for Young People in a Program Context: Lessons from Four Case Studies. In I. Saleh & M. S. Khine (Eds.), *New Science of Learning: Cognition, Computers and Collaboration in Education* (Vol. Part 2: Computers and New Science of Learning, pp. 357-383).

The goals of the VCLC project, a pilot study, were to: (1) facilitate peer networking building amongst same age pediatric post-transplant patients; (2) encourage medical adherence through activities in a virtual environment that fostered discussion, sharing of experiences, and informal content delivery; and (3) support post-transplant patient's psycho-social adjustment to lifestyle changes by creating a community. The project, a collaboration with several psychiatrists and other medical staff members in the pediatric transplant program at Boston Children's Hospital, started in late August of 2006 and ran through the summer of 2007. In order to be eligible for the project, youth had to be between 11 and 15 years old, have had a transplant procedure and received post-transplant follow-up treatment at Children's Hospital Boston, and not be experiencing severe emotional or physical distress. Members of the post-transplant medical teams referred patients to the project based on the patient's age and the health status. The research team then contacted and invited eligible families to participate in the project. Most participants used Zora from their homes and at times, during hospitalizations (Bers et al., 2007; Satoh, Beals, Chau, & Bers, 2007; Satoh, Blume, DeMaso, Gonzalez-Heydrich, & Bers, 2008).

The project team originally contacted 54 patients through phone calls and mailings; 31 verbally agreed to participate and 25 returned the necessary consent and assent forms. Of these 25, the project team could not provide Internet to three due to their remote locations and three never logged in into Zora, thus the group was composed of 19 children. Forty-five percent of the participants were female and the average age at the start of the program was 13.7 years. Of the original 22, there were 13 participants from the heart transplant program, 3 from liver, and 6 from renal. Twelve participants were from Massachusetts, one from Florida, one from Maine, three from New Hampshire, two from New York, and three from Rhode Island. Regardless of their original ailment or the organ they received, they all shared the experience of going through organ transplantation and thus were all committed to a life-long regimen of medications and follow-up invasive interventions.

Participants engaged in weekly online activities for the duration of the study. While they were free to log on at any time, the group activities followed a semi-structured curriculum aimed at sparking conversations about transplant experiences by encouraging them to create virtual spaces such as a Health Museum and a Pharmacy. During the project, each user logged into Zora an average of 60 times and spent an average of 39 hours logged into the program. This represented almost seven hours more online than anticipated, as the project team planned weekly on-line activities for a total of 32 hours. Users created 4,027 objects and made 75 virtual houses. For example, they created a Legislature House where they put recommendations for hospitals to ease the stay of the patients, such as "*soft pillows*", "*beds with comfortable mattress pads on them...especially in the cardiac cathlab, where you have to lay flat for six hours*" and suggestions for schools to ease transitions after prolonged hospitalizations, "*so kids don't have to tell stories so many times.*" (Bers et al., 2007)

During interviews, users reported positively about their experience with the project, especially about being able to meet other children who had received a transplant as made evident by a feedback from a participant:

> *I believe that taking part in Zora did give me inspiration. I only had a liver transplant, and I cannot have tunnel vision that there's only me, but there are a multitude of other kids that have gone through similar experiences as myself. They inspired me to help educate others about organ donation, because there are kids like us whose lives have been saved through the gift of organ donation.*

A social worker described Zora as providing *"something that none of [the patients] Doctors or medical professionals could—a connection to other kids who knew exactly how he was feeling and experience the unpleasant things that go along with transplant each and every day."* (See Appendix B for additional information about the curriculum, mentoring model, project scale, contact with participants, and data collection and assessment for this project.) The year-long VCLC project provided the foundational experience upon which the context of study presented in this dissertation was based, the ClubZora project. In the next chapter, I will discuss the ClubZora project in detail.

Chapter 3: Context of Study and Procedures

In the previous chapters, I introduced the problem statement, motivation, and research questions for this study. I also provided a review of the literature, focusing on technology and internet use by youth, virtual world software, key developmental tasks for preadolescents, and virtual world programs. In this chapter I will discuss the context and procedures of the study. For the context of the study, I will provide background about the Zora software and the ClubZora virtual world program. For the study procedures, I will discuss both design-based research as well as program evaluation.

Context of Study

The Zora software.[22] Zora is a multi-user virtual world that has been used since 1999 with several very different populations of youth, including those with end-stage renal disease undergoing dialysis treatment (Bers, Gonzalez-Heydrich, & DeMaso, 2003), multi-cultural groups (Bers, 2008a; Bers & Chau, 2006), freshman in college (Bers & Chau, 2010; Chau & Bers, 2007, April 9), post-transplant pediatric patients (Bers, Beals, Chau, Satoh, Blume et al., 2010; Satoh et al., 2007; Satoh et al., 2008), participants in national and international after-school computer-based learning centers (the ClubZora project) (Beals & Bers,

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[22] This section and the next (“The ClubZora Virtual Worlds Program”) were adapted from two previously published articles:

(1) Bers, M., Beals, L., Chau, C., Satoh, K., & Khan, N. (2010). Virtual worlds for young people in a program context: Lessons from four case studies. In I. Saleh & M. S. Khine (Eds.), *New Science of Learning: Cognition, Computers and Collaboration in Education* (Vol. Part 2: Computers and New Science of Learning, pp. 357–383).

(2) Beals, L., & Bers, M. (2010, May). Evaluating participation in an international bilingual virtual world educational intervention for Youth. *Journal of Virtual Worlds Research, 2*(5). Retrieved from https://journals.tdl.org/jvwr/article/view/810/718.

2009, April), and most recently, with children who have cancer (Cantrell & Bers, 2010a, 2010b; Cantrell, Fischer, Bouzaher, & Bers, 2010). The name Zora was inspired by one of the imaginary cities described by Italo Calvino: “This city is like a honeycomb in whose cells each of us can place the things we want to remember . . . So the world's most wise people are those who know Zora." (1972, p. 13). The belief is that when youth engage with Zora, they will also become wiser by learning about themselves.

Zora was originally designed upon constructionist learning principles (Papert, 1980), which asserts that people learn better when they are engaged in building personally meaningful artifacts and sharing them with others in a community. From this perspective, then, one aspect of the design of technology should be to provide the tools and resources necessary for individuals to be able to create personally meaningful projects. Bers (2008a) identified four pillars of educational experiences designed within a constructionist framework: (a) the potential of technological environments to help learners learn by doing, by actively inquiring, and by playing; (b) the importance of objects for supporting the development of concrete ways of thinking and learning about abstract phenomena; (c) the need for powerful ideas that span across different areas of the curriculum; and (d) the premium of self-reflection which engages learners in meta-cognition. These constructionist pillars provided an overarching framework for the design of Zora.

Newer versions of Zora were also designed using Bers’ *Positive Technological Development* (PTD) framework that addresses the question: “How can we develop interventions to help children use technology in effective ways to learn new things, to express themselves in creative ways, to better communicate, to take care of themselves and each other, and to contribute in positive ways to self and society?" (Bers, 2006). Informed by the strengths and assets of young people and based on the understandings of how children can use technology in important and meaningful ways, PTD focuses on supporting youth in developing positive attitudes, predispositions, and skills for using technology with the goal of becoming contributors to their own personal growth and to society (Bers, 2008a, 2008b; Bers, Beals, Chau, Satoh, & Khan, 2010). Within this PTD framework, Zora includes tools for *content creation*, *creativity*, *collaboration*, *communication*, *community-building*, and *choice of conduct* (Bers, 2010).

In Zora, users can populate the virtual city by making their own places and interactive creations, including 3D objects, characters, message boards, and signs, as well as movies, pictures, and sounds via easy-to-use tools (see Figure 4). Upon logging into Zora at the start of a project, users encounter an initial blank 3D world. Their task is to create the virtual world's public and private spaces and populate it with interactive objects. While using building tools in Zora, users learn basic computer programming principles as well as gain technological fluency (Barron, 2004).

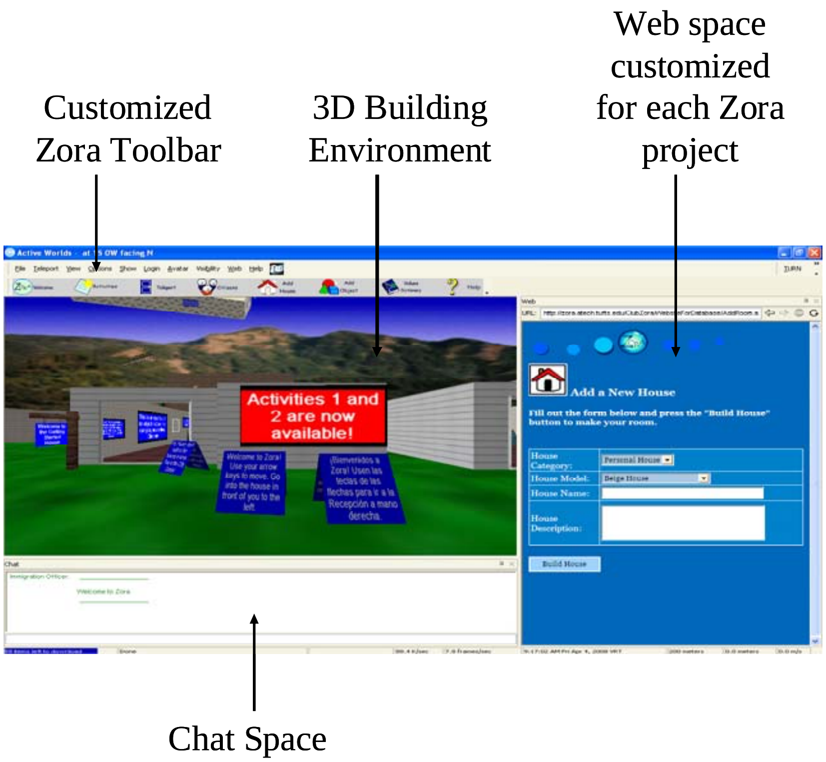

Figure 4. The Zora virtual world, as customized for the ClubZora project.

In addition to making virtual objects and narratives, Zora provides a real-time chat system for participants to communicate with each other while navigating throughout the virtual world. Users can also communicate with each other via message board objects; the ability to leave messages allows for asynchronous communication among users. The environment is purposely designed to provide both synchronous and asynchronous modes of communication in order to accommodate different communication preferences and time zones.

Marina Bers developed the first version of Zora in 1999 using the Microsoft Virtual Worlds development platform (Bers, 2001). The DevTech

Research Group, in collaboration with Academic Technologies at Tufts University, revised and updated the version of Zora used in the VCLC and ClubZora projects to use the Active Worlds platform (Grogan & Satoh, 2006, November 9). Several educational research projects, such as Quest Atlantis (Barab, Thomas et al., 2005), River City (Nelson, Ketelhut, Clarke, Bowman, & Dede, 2005), and SciCenter (Corbit & Norton, 2007, November; Norton, Corbit, Greene, & Ormaechea, 2008) have used the Active Worlds platform for developing multi-user environments.

Each action performed by the participants in Zora is logged into a database; the data can then be accessed and analyzed with a customized web-based log-parser developed by the DevTech Group (Figure 5). The log-parser has four sections: (a) the *Administration* section, for exploring population demographics; (b) the *Search* section, for searching for data related to software usage (i.e., logging on/off, conversations, objects, etc.); (c) the *Reports* section, for quickly viewing common queries; and (d) the *Graphs* section, for examining and downloading common graphs, such as logins over time, logins by user, etc. For the search, reporting, and graph functions, the data can be filtered by date range and/or by user or users. The data can be viewed directly on the webpage or downloaded as an Excel file for further analysis. In addition, Academic Technologies at Tufts University, as they were hosting and administering the world servers, each week sent the ClubZora project administrators a file called a *prop dump*, a master registry of the objects created in Zora. These prop dump files allowed project administrators to have a more accurate representation of the world, as the files contain the date of creation, coordinates, and owner of each object. The files can be used with third-party tools to create maps that could show a snapshot of the world at the date of the prop dump.[23]

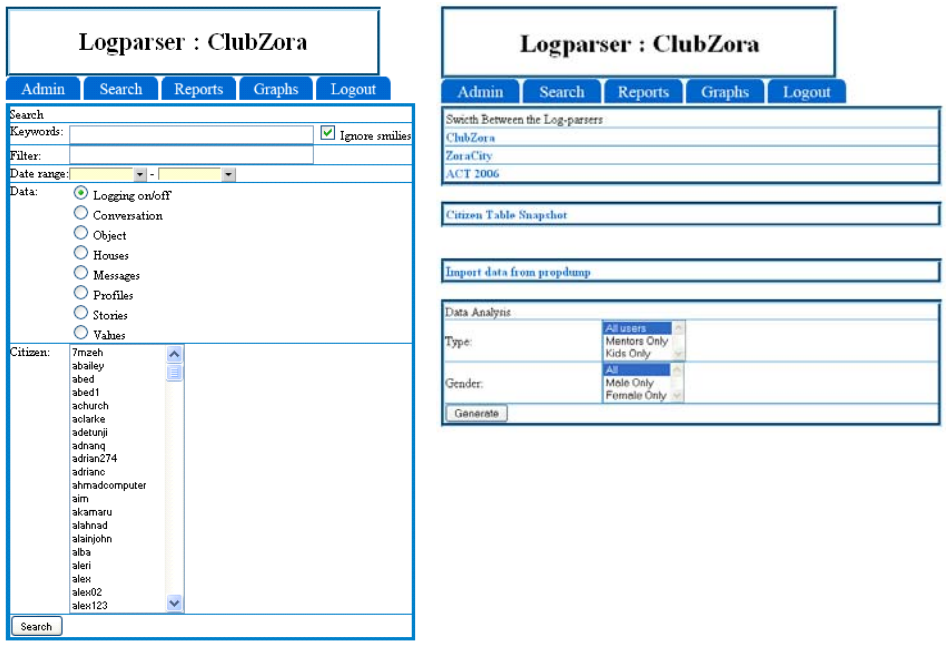

Figure 5. The Zora Log parser search page for usage statistics (left) and participants (right).

The ClubZora Virtual World Program. The ClubZora project was an international virtual world program in which the administrators, for the most part, did not have face-to-face communication with youth members. This was a very different model from other projects in which Zora had been used, such as the VCLC project at Children's Hospital Boston (described in Chapter 2). Therefore,

[23] One example of a map-making tool is Mapview, available from http://www.andras.net/tools.html#mapview.

though the software itself was not being piloted, the implementation of Zora in this context was. Key aspects of the program—such as location, staffing, mentorship model, software and information dissemination, enrollment procedure, and access environment—are described in detail below.

The Intel Computer Clubhouse Network. As with any intervention program, it is important to be respectful and accommodating to the culture of the organization with which one is working (Fantuzzo, McWayne, & Childs, 2006). For example, many of the decisions in the management of the ClubZora project were done so as to be respectful of the organization's goals and mission. Therefore, in this section, I will provide a brief introduction to some of the important aspects of the Computer Clubhouses as a context for better understanding the project.[24]

The Intel Computer Clubhouse Network is a nonprofit program whose mission is "to provide a creative and safe afterschool learning environment where young people from underserved communities work with adult mentors to explore their own ideas, develop skills, and build confidence in themselves through the use of technology" (The Intel Computer Clubhouse Network, n.d.-c). Began in 1993, as a collaboration between the Computer Museum (now the Boston Museum of Science) and the MIT Media Lab, the Clubhouses serve youth between the ages of 10 and 18. There are currently over 100 Clubhouses around the world, in 21 countries serving over 25,000 youth (The Intel Computer Clubhouse Network, n.d.-b). In addition, "Computer Clubhouse Members have

[24] For more detailed information about this organization, please visit their website at www.computerclubhouse.org.

free access to high-end technology, video, graphic and web design, music production, as well as college and career preparation" (The Intel Computer Clubhouse Network, n.d.-b). Each Clubhouse has a paid coordinator and volunteer adult mentors who share their experiences and serve as role models. While all Clubhouses are located within underserved communities, some Clubhouse locations are stand-alone buildings while others are located within community-based organizations, such as YMCAs or Boys and Girls Clubs. Thus, they attract a wide variety of youth from many different backgrounds and experiences.

There are four guiding principles of the Computer Clubhouse learning model:[25]

Principle 1: Learning by Designing. People learn best when they are actively engaged in designing, creating, and inventing, not just passively receiving information.

Principle 2: Following your Interests. When people care about what they are working on, they are willing to work longer and harder, and they learn more in the process.

Principle 3: Building a Community. When people collaborate with others of diverse ages, cultures, genders, and backgrounds, they gain new perspectives for understanding the world—and understanding themselves.

[25] Each of these principles is described in more detail on their website: http://www.computerclubhouse.org/content/learning-model.

> *Principle 4: Respect and Trust.* In places where everyone's ideas and opinions are respected, people are more likely to take risks and experiment—and thus more likely to learn and innovate. (The Intel Computer Clubhouse Network, n.d.-a)

Every year Coordinators gather for a multi-day conference in which they can attend learning sessions and presentations about activities within the Clubhouse. Every two years, select youth members from each of the Clubhouses are invited to attend the *Teen Summit* held at a university in Boston, Massachusetts. During this event, there are:

> . . . opportunities for Clubhouse youth to express their ideas with high-end technologies, such as graphic design, video animation, digital art, music, radio and documentary film-making, and 3-D modeling. Each Teen Summit . . . includes a college and career fair, collaborative activities with youth from around the world, and many other opportunities for educational, career and personal growth. (The Intel Computer Clubhouse Network, n.d.-e)

During the course of this project, I, as the ClubZora project manager, attended two Coordinator conferences as well as the 2008 Teen Summit.

Clubhouse Coordinators, mentors, and members also have access to an internal website called *The Village*. On *The Village* members can share projects, participate in discussions, and access a secure email system in which only emails from people within the organization can be received. *The Village* supports multiple languages and allows users to translate text throughout the site in order to maximize access to members (The Intel Computer Clubhouse Network, n.d.-d).

As the Clubhouses are located around the world, there is little opportunity outside of *The Village* for interactions between members of different locations in order to create a larger community; one of the guiding principles of the organization revolves around the building of a community in order to gain new understanding of the world. Even in years in which there is a Teen Summit, only a few members of each Clubhouse are able to attend. In addition, while *The Village* is a place in which members can share projects and learn about events in the organization, there are not many opportunities for synchronous activity. The Zora virtual world was brought to the Clubhouse Network as a tool to aid in the development of a community of members. Furthermore, as will be described in more detail below, Zora was uniquely designed in such a way as to allow individuals to learn by designing, creating, and inventing, as stated in the Clubhouse Guiding Principle 1. Thus, one of the main goals of the ClubZora project, at its beginning, was to provide a virtual space for Computer Clubhouse members around the world to build a strong community.

Because this project was done within the larger context of an international organization, the research team had to be respectful and accommodating to their organizational rules and ideals. For example, in the online Zora Ambassador guide, the research team wrote, as required by the Clubhouse Network director and staff liaison:

> The culture of the Clubhouse is one in which “school-like” language or concepts as well as competition is not advised—for example, instead of the word *curriculum*, the word *activities* is used. Instead of a *rewards* system we have a *recognition* system. Instead of *questionnaires* we ask for *feedback*. And, the word *research* is not used with the youth either. Remember, you are working with kids who are in a place that is not school (and specifically designed to be a non-school-like atmosphere)—we want Zora to be a fun and interesting place to be!

In addition, the Clubhouse Network provides access to advanced ,cutting-edge technology and serves as a test-site for a range of research projects, all of which are competing to catch youth’s attention and engage them in a sustained way. During the ClubZora project this was also true; there were several projects underway simultaneously, so youth could chose what activities in which they wanted to participate. As will be described in Chapter 3, this is a common challenge to evaluation in nonformal educational settings.

Staffing. The ClubZora project team consisted of several members from the DevTech Research Group, located in the Eliot-Pearson Department of Child Development at Tufts University. Marina Bers, an associate professor in the department, served as the director of the project. I was the project coordinator, and therefore was involved in all facets of the project, including the updating of the Zora software for the ClubZora project, the design of the ClubZora program, program implementation, report writing, data analysis, and dissemination of findings. In addition, I worked directly with the youth in Zora on a weekly basis throughout the duration of the project. In this dissertation, I will refer to my role as the project coordinator for the ClubZora as either *project administrator* or as *project coordinator*. In addition, a Ph.D. student from the Computer Science Department and another Ph.D. student from Child Development provided technical assistance. One staff member from the Museum of Science Boston (headquarters for the Computer Clubhouse) was a liaison to the project, as was one staff member from the MIT Media Lab who worked on *The Village* website. In addition, several graduate and undergraduate students from Tufts, as well as a high school student, worked on the project as Zora Ambassadors, a role that will be described below.

The mentorship model. There were two types of mentors for this project, called *Zora Ambassadors*, not to be confused with the adult mentors at the Clubhouses. The two types of Zora Ambassadors were: (a) Ambassadors who went to three local Clubhouses and met the youth face-to-face and (b) online Ambassadors who worked with the Clubhouse members virtually through Zora only. The three Ambassadors to the local Clubhouses were two undergraduate students and one graduate student who visited their respective Clubhouses once a week during the Fall of 2007 to help install Zora, teach members how to use the software, and encourage them to use Zora. At the end of each session, the Ambassadors submitted field notes, based on a template, to the project coordinator. Because Zora was not launched until November of 2007, however, and because the academic semester ends in early December, the Ambassadors to the local Clubhouses were not able to work with the youth on Zora as much as had been planned at the start of the project. More details about the online mentors in this project will be described in Chapter 7.

Software and information dissemination. In April of 2007, the project coordinator presented at the annual conference of Clubhouse Coordinators. At this conference, she had the opportunity to introduce Zora briefly to the entire audience as well as in more detail at a longer, voluntary session. During this time, she gathered feedback and suggestions from the Coordinators and other staff and later incorporated these comments into the redesign of the Zora software for the Clubhouses, as described previously. In addition, the project coordinator worked with Clubhouse administrative staff to add functionality to *The Village* whereby users would have access to a “Register for ClubZora” button on their profile pages. Also, the project coordinator was given access to *The Village* discussion boards in which she was able to create two sections—(a) an information page, to which all Village users had access, about Zora that included information about how to enroll in and begin using Zora at a Clubhouse; and (b) a Clubhouse-staff-only page that provided a *Coordinator Manual* that detailed the project, a *User Manual* which described how to use Zora, the software downloads, and instructions for installing the software. All documents were available in English and Spanish. Because of the policies in place at the Clubhouse, youth were not able to install software, hence the installer files were only available to staff members. In addition, though it was requested by several Coordinators/Mentors and youth throughout the project, ClubZora was only intended to be used while at the Clubhouses and was not supposed to be used at home or in settings outside the Clubhouse.

Enrollment procedure. Clubhouse members who had an account in *The Village* could request enrollment into the ClubZora project by clicking on a button on their profile page (Figure 6). They were then directed to the online enrollment form (Figure 7), which required members to agree to the *ClubZora Code of Conduct* prior to submitting their enrollment request (Appendix C). The project coordinator received these requests electronically and examined them to make sure that they were from legitimate members of *The Village*[26], in order to ensure the safety and integrity of the community. The project coordinator, after confirming Village membership, enrolled the user in the project and emailed the ClubZora username and password to the Village email provided. The project team extended enrollment to Clubhouse mentors and Coordinators, as these adults were key components to the larger Clubhouse community. Participation in the project was completely voluntary and at the discretion of a Village member to join.

[26] If the ClubZora enrollment form was properly accessed through the Village, the project coordinator electronically received information via hidden fields that indicated the legitimacy of the request.

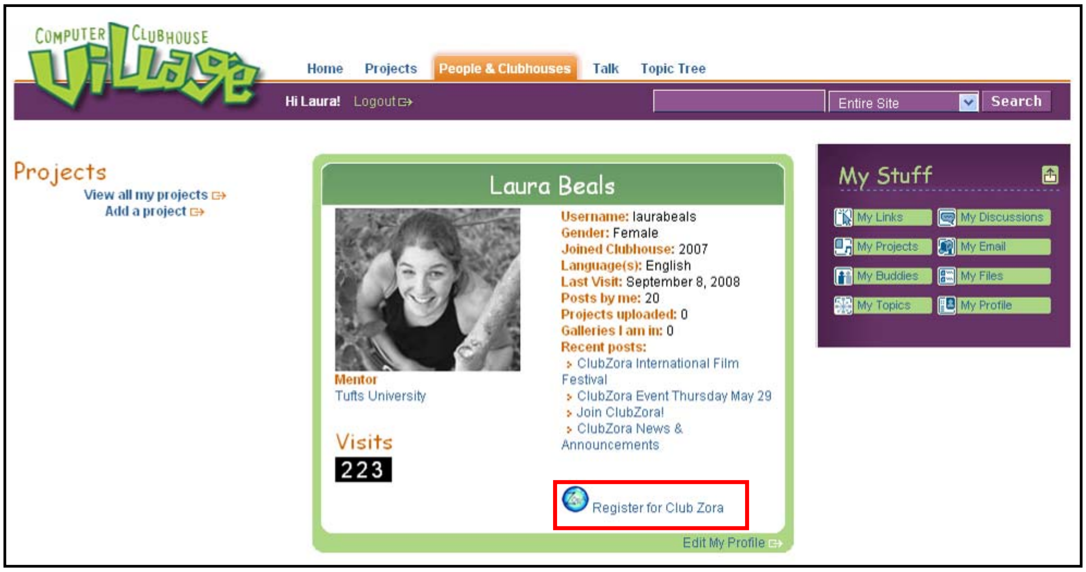

Figure 6. ClubZora enrollment button on a user's profile within *The Village*.

Figure 7. ClubZora enrollment form, auto-populated with information from *The Village*.

Access environment. All Clubhouses were invited to participate in the ClubZora project; however, there were two guidelines:

(1) The only supported languages were English and Spanish. This included support documents, communication, and the Zora software itself. While members using other languages could participate, the written language used in Zora had to use the Latin character set (i.e., participants in those Clubhouses in which non-Latin characters, such as Arabic or Chinese, were used had to switch to a Latin character set to be able to chat and modify text in Zora).

(2) A high-speed, consistent network connection was required. The software was only available as an online download and because of the heavy graphics load when running, a low-speed Internet connection would have slowed Zora down to the point where it would have been impossible to use.

Updates to the Zora software for the ClubZora project. The project team at Tufts redesigned the user interface for ClubZora from previous projects, incorporating new aesthetics, such as font choice, icons, and color scheme. The team also added the ability for users to incorporate movies, music, and pictures, which could link to projects in their Village accounts. This functionality allowed users to showcase in Zora the projects they completed in their Clubhouses, in addition to pictures, videos, and music from outside the Clubhouse that they added in order to represent themselves. The project team limited the library of objects that were available to ClubZora users to populate the city; though the

Active Worlds library contains thousands of pre-made 3D objects, initially ClubZora users were only given 35 objects to use.[27] Generic objects, such as cubes, picture frames, and TV screens, allowed users to use their imaginations to invent objects that were not available to them as pre-made models.

The project team enacted this limitation to encourage users to think creatively "outside the box" about what they wanted to build and how they wanted to portray themselves in the community. For example, one member created a pyramid that could be climbed or explored from the inside by using the generic cubes overlaid with a picture of stones. Because many of the available objects allowed for personalization with the use of pictures or video, these objects encouraged users, for example, to "show off" their Clubhouse projects or to highlight their hobbies and interests.

In addition, from a technical perspective, the administrative functions were upgraded significantly to allow project staff to enroll new users, administer surveys within Zora, and create activities that could be released on a weekly basis. The project team also updated all of the help and support documents to reflect the changes to the software for this project.

Zora is a secured- and password-protected virtual world software that was only available to members of the Clubhouses. As all users had to agree to participate in the research in order to participant in the project, the research team had full access to data collected during the project. These data included the

[27] A limitation of the Active Worlds platform customization, as manifested in Zora, is that users, if they learned how to "hack" the properties for objects, could easily access the entire AW library. Therefore, while we only officially supplied the 35 base objects, several members of the Clubhouse Network quickly figured out how to work around this limitation.

artifact log files, chat log files, access log files (i.e., time logged in/out), enrollment data, screenshots and video captures, Zora Ambassador field notes, communications, and questionnaire responses. The Institutional Review Board (IRB) at Tufts University approved this study.

Summary of the ClubZora program. The ClubZora project was unique in several ways. First, the Zora software, while not being overtly or explicitly educational, was not just a "fun game" or website for youth to use, as are some of the most popular stand-alone virtual worlds for youth today (KZero Research, 2008). Rather, its structure was designed to support youth's positive development with technology in the context of a program. However, unlike other educational virtual world projects, such as QuestAtlantis, RiverCity, or SciCenter (Barab, Kling, & Gray, 2004; Barab, Thomas et al., 2005; Corbit & Norton, 2007, November; Dede et al., 2005; Dede et al., 2004; Norton et al., 2008), the ClubZora project, and how it was implemented within the organization, was never intended to explicitly teach an "academic" topic, such as math, science, or history. Therefore, the Zora curriculum was looser and more emergent, based on the interests of the youth, rather than having, for example, a predetermined set of activities that a user must complete. Furthermore, ClubZora was a project in which youth were allowed to build and contribute to the city in ways that were meaningful to them, however they saw fit, unlike the other projects, such as Quest Atlantis, in which much of the world is pre-built and users interact with these pre-determined characters and activities. Even in SciCenter or SciFair, in which users can build objects within the world, the theme is still strictly based on the concept of a Science Museum or Science Fair (SciCenter, 2009), and therefore users are not able to build freely.

Second, the ClubZora project attempted to introduce a new technology—a virtual world—to youth within a particular organization with minimal face-to-face contact with members. These two challenges—the virtual implementation and working within the context of an afterschool organization—are important to note. Several of the previously mentioned educational virtual world programs for youth involve the use of the software within a classroom. In these scenarios, though the youth may be interacting virtually within the software, they are introduced to the software, led through the program, and encouraged throughout via face-to-face interactions with a teacher or other adult leader. Additionally, users most likely sit in the same room as the other youth using the software (which, may be true during this project as well, if users were from the same Clubhouse), resulting in different forms of interactions and mentoring, both in the virtual world and in the face-to-face context.

Finally, the research team was working within an afterschool organization that has its own mission, guidelines, and structure. While the other virtual world projects work with schools or in school-like settings, which in themselves have limitations in terms of what can be done, they are often more structured environments in which participation with the programs might be what the youth “have” to do at any given time, unlike ClubZora in which a youth would have to purposefully choose to participate in the project on their own. Therefore, the ClubZora project, in as much as the research team is aware, was a unique intervention without any available direct comparison. This uniqueness, while exciting, meant that the research team was charting new territory with this pilot project aimed at understanding how the various variables at play—a virtual program within an afterschool environment—would affect the implementation of a virtual world software. In addition, the challenges presented by the ClubZora project, and more generally by technologically-based interventions within real-life contexts, require research methods that are adaptable to these situations.

Procedures

Two research perspectives contributed to the procedures of this study: design-based research (DBR) and program evaluation. DBR informed both the development of the Zora virtual world software and resulting programs, including this study specifically. Program evaluation was the approach with which the second research question of this dissertation study was addressed: *How can virtual world programs for children be evaluated in order to understand both the process by which the program is implemented and the outcomes achieved by the program?*"

Design-based research. The interdisciplinary field of the learning sciences aims to understand learning, cognition, and development. At its core, researchers in the learning sciences attempt to understand the nature and conditions of these areas by examining them in context (Barab & Squire, 2004). To do so, the field has pulled from a variety of theoretical and research perspectives. In addition, in the learning sciences, the researcher is also often the designer of the learning context and therefore a means by which to generate evidence-based claims is necessary. One such methodology is DBR.

Brown (1992) provided some of the first insights into design experiments (Barab & Squire, 2004), based on her classroom research, in which she states, “as a design scientist in my field, I attempt to engineer innovative educational environments and simultaneously conduct experimental studies of those innovations” (p. 141). DBR, then, may be used both to test a design within context and also to generate a theory about learning that can then be applied to practice.

As an overview, Barab and Squire (2004) described DBR as focusing “on understanding the messiness of real-world practice, with context being a core part of the story and not an extraneous variable to be trivialized. Further, design-based research involves flexible design revision, multiple dependent variables, and capturing social interaction” (p. 3). In addition, unlike in traditional laboratory-based experiments, participants in DBR innovations are not *subjects*, but rather *co-participants* in the design, and perhaps even the analysis, of the innovation.

More specifically, The Design-Based Research Collective (2003) proposed five characteristics of DRB: (a) the design of the learning environment and the development of learning theories are intrinsically related; (b) repeating cycles of “design, enactment, analysis, and redesign” (p. 5) are the key means through which research and development occur; (c) the resulting theories and implications must be shared with practitioners and designers of educational contexts; (d) in order to enhance the understanding of the learning process, the researchers must document the successes, failures, and interactions of the design, as it occurred in the context of authentic settings; and (e) “the development of such accounts relies on methods that can document and connect processes of enactment to outcomes of interest” (p. 5).

More succinctly, Wang and Hannfin (2005) define DBR “as a systematic but flexible methodology aimed to improve educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings, and leading to contextually-sensitive design principles and theories” (p. 6). Furthermore, they propose their own five basic characteristics of DBR: (a) pragmatic; (b) grounded; (c) interactive, iterative, and flexible; (d) integrative; and (e) contextual. For many reasons, the continuously-evolving concept of DBR is an ideal methodology for working within the contexts of naturalistic educational innovations.

DBR methodology. Simultaneously to the research of Brown (1992), Collins (1992) also introduced the concept of design experiments. Collins and colleagues (1999; 2004) described key theoretical and methodological issues facing design-based researchers, partially by comparing laboratory studies and design experiments along seven dimensions, as summarized in Table 2.

Table 2

Comparison of Laboratory Studies to Design Experiments along Seven Dimensions according to Collins, Joseph, and Bielzczyc (2004).

Laboratory Studies	**Design Experiments**
Laboratory settings	Messy situations
Single dependent variable	Multiple dependent variables
Controlling variables	Characterizing the situation
Fixed procedures	Flexible design revision
Social isolation	Social interaction
Testing hypothesis	Developing a profile
Experimenter	Co-participant design and analysis

Note: See also Barab and Squire (2004) for a comparison of laboratory-experiments and design experiments.

Collins, Joseph, and Bielzczyc (2004) describe six guidelines for carrying out DBR: (a) implementing a design, (b) modifying a design, (c) analyzing the design in multiple ways, (d) measuring the dependent variables, (e) measuring the independent variables, and (f) reporting on design research. The details of these guidelines are shown in Table 3.

Though the methodology of DBR is still evolving, as is the parent field of the learning sciences, DBR provides an important methodological toolkit for researchers who are also designers of educational innovations. As Barab and Squire (2004) wrote, “Design-based research is not so much an approach as a series of approaches, with the intent of producing new theories, artifacts, and practices that account for and potentially impact learning and teaching in naturalistic settings" (p. 2). DBR is particularly suited to educational innovations that use technology, as the field of the learning sciences has "made major investments in the design and development of learning environments that employ technology to foster thinking and understanding with demonstrated positive effects on learning" (Fishman et al., 2004, p. 43; Roschelle, Pea, Hoadley, Gordin, & Means, 2000).

Table 3

Guidelines for Carrying out Design Research According to Collins, Joseph, and Bielzczyc (2004).

Guideline 1: Implementing a design.
Identify the critical elements of the design and how they interact
Characterize how each was addressed in the implementation
Guideline 2: Modifying a design
If elements of a design are not working, modify the design
Each modification starts a new phase
Characterize the critical elements for each phase
Describe the reasons for making the modifications
Guideline 3: Multiple ways of analyzing the design
Cognitive
Resources
Interpersonal
Group or classroom
School or institution
Guideline 4: Measuring dependent variables
Climate variables (e.g., engagement, cooperation, and risk taking)
Learning variables (e.g., dispositions, metacognitive, and learning strategies)
System variables (e.g., ease of adoption, sustainability, spread)
Guideline 5: Measuring independent variables
Setting
Nature of learners
Technical support
Financial support
Professional development
Implementation path
Guideline 6: Reporting on design research
Goals and elements of the design
Settings where implemented
Description of each phase
Outcomes found
Lessons learned
Multimedia documentation

Note: Adapted from “Design Research: Theoretical and Methodological Issues” by A. Collins, D. Joseph, and K Bielaczyc, 2004, *Journal of the Learning Sciences*, 13(1), p. 33.

DBR and technological interventions. Creators of technology innovations must focus on the sustainability, scalability, and usability of their designs by understanding their innovations within the contexts of their use (Fishman et al., 2004). These concepts of sustainability, scalability, and usability are intertwined—in order for a innovation to be adopted, it must be usable; if it is not adopted, it will not be sustained or scaled (Fishman et al., 2004). A key question, then, is what does it mean for a technology-based innovation to be “usable”? To this question, Fishman, Marx, Blumenfeld, Krajcik, and Soloway (2004) respond: “A basic answer is that an innovation is usable if a school organization can adapt the innovation to local context, enact the innovation ‘successfully’ (as jointly defined by the school and the developer), and sustain the innovation” (p. 51).

The importance of understanding the innovation within the local context is a central component of scalability. Building upon the work of Coburn (2003), Dede and Clarke (2009a; 2009b) outline five inter-related dimensions of scale: depth, sustainability, spread, shift, and evolution. In order for an innovation to be scalable, designers must create theories that are flexible to the local context while still remaining useful (Barab & Squire, 2004). Furthermore, researchers must develop theories and designs that do not fall into a “replica trap” (Wiske & Perkins, 2005)—attempting to replicate a design that worked in one context in another, without accounting for differences in the needs and environments of the new context (Clarke & Dede, 2009a). Virtual world programs have not just one context, but two—the face-to-face and the virtual.

DBR and virtual worlds. Why is DBR a useful research approach for studying virtual worlds? Santos (2010) states:

> From a situated learning perspective, learning in a virtual world is conceptualized as a process distributed across avatars, the environment, and the learning activities in which they engage. If we accept this assumption, we must employ a research paradigm that considers the social context as part of its unit of analysis instead of just the individual's cognitive process and learning to understand more profoundly how cognition and learning occur within a virtual world. (p. 2)

DBR is such a research paradigm that has been used recently as a methodology for studying virtual worlds, including within this dissertation study. Examples of virtual world programs engaged in design-based research include River City (Clarke & Dede, 2009a; Dede et al., 2004), Quest Atlantis (Barab, Arici, & Jackson, 2005), and SimEscuela (Santos, 2010). Santos (2010) describes how DBR should be adapted for use in virtual worlds research. He proposes three steps: (1) describe the virtual world, (2) iterate cycles of implementation-findings-implications, and (3) write a final report integrating findings from all cycles. It appears that these steps correspond to the DBR Guidelines 1, 2, and 6 of Collins, Joseph, and Bielzczyc (Collins et al., 2004). Because virtual worlds are situated within a naturalistic context, and because they are a relatively new educational technological innovation that could benefit from the development of theories related to learning within them, DBR is an appropriate methodological choice for the study of virtual worlds.

DBR in the context of this study. DBR was the main procedure by which this study was constructed, implemented, and analyzed. The ClubZora research team utilized DBR for a variety reasons:

(1) *Naturalistic context.* The ClubZora project was completed within the larger context of the Intel Computer Clubhouse Network. As such, it was a “messy situation,” one that was suited to a design experiment.

(2) *Iterative methodology*. Zora has been used in a variety of settings since 1999; both the Zora software and the overarching program implementation have been analyzed and redesigned at each iteration, taking into account the successes, failures, and interactions of each iteration. DBR, at is core, involves the refining and testing of models (Barab & Squire, 2004; Collins et al., 2004), which is what has occurred within each implementation of Zora. This particularly occurred for the ClubZora project, as described previously in the context of this study, in which major changes to both the Zora software and program implementation were done based on experiences with the VCLC project. This cycle of testing and refining continued throughout the ClubZora project, and this study aims to highlight the successes and failures of this project in an attempt to refine the model further.

(3) *Role of researcher as designer* (Barab & Squire, 2004). Most researchers of large-scale studies of technology in education are not the developers of the innovation; therefore, they have an etic (outsider)

perspective. However, in DBR, the designer of the innovation is often also the researcher, resulting in an emic (insider) perspective (Fishman et al., 2004), which was also true of the ClubZora project. As described above, I not only served as the designer of this ClubZora program (along with my colleagues in the DevTech Group), I was the project administrator during the implementation of the program and the main researcher at the conclusion.

(4) *Development of theory.* A fundamental purpose of design experiments is to develop theory and to further our understandings of technological innovations within naturalistic contexts. The purpose of this study was to create a framework that describes attributes that inform the design and evaluation of virtual world environments, based on the Zora programs in which I was involved.

(5) *Usability, scalability, and sustainability.* As described in Chapter 1, my motivation for this study stems from my desire to create a framework that is pragmatic and usable for virtual world designers and researchers. As such, I have attempted to generate a framework, based on seven attributes (to be discussed in the following chapters), that is applicable to virtual world programs for youth, and in particular for virtual world programs for preadolescents. My hope is that this framework is usable to designers and researchers, and is broad enough to be scaled and sustained in a variety of contexts.

DBR was the methodological choice for both the design of the Zora software and associated programs as well as this dissertation study. The environment of the ClubZora project was "messy" and this resulted in the need to continually examine the program and research design and re-shape as needed; therefore, traditional "laboratory-esque" methods would not be adequate. In addition, a core component of DBR is the generation of theory that can be applied across contexts; this dissertation study aims to do just that.

Program evaluation. While DBR is an important methodology for designing new tools and methods, particularly technology-based innovations, and for generating new theories about learning that can be tested and refined through the innovations, it is a methodology best suited to researchers in academic settings. Researchers in academic settings who use virtual world programs often employing DBR methodology, produce important findings that further the field's thinking about learning in new contexts. However, evaluation should be a core feature of all programs, including those outside of university settings; the reasons for such will be described below.

In particular, "what distinguishes evaluation research [from social science research] is not method or subject matter, but intent—the purpose for which it is done. . . . Evaluation is intended for *use* [emphasis added]" (Weiss, 1998, p. 15). Virtual world software is engaging large audiences of youth; it only makes sense that program designers harness this interest to create new and innovative programs that use this software. However, as described in the previous chapter, the idea of virtual world programs is new, and as such, those that currently exist, and those that are on the horizon, need to document, analyze, and understand their programs so that they can learn from their successes and failures in order to improve both future iterations of their program and future new programs. Program evaluation is one means by which this understanding of virtual world programs can be moved forward; this should not be a task that is limited just to academic researchers, but should be one that is accessible and available to program stakeholders, including program administration and participants.

First, however, the term *evaluation* must be defined. For the purposes of this study, I define evaluation as “a set of systematically planned and executed activities designed to determine the merit of a program, intervention or policy, or to describe aspects of its operation” (Jacobs & Kapuscik, 2000, p. 3). This definition was chosen due to the broadness of scope; other definitions—for example Weiss (1998) defined evaluation as “the systemic assessment of the operation and/or the outcomes of a program or policy, compared to a set of explicit or implicit standards, as a means of contributing to the improvement of the program or policy” (p. 4)—were too limiting in scope for this study.

Second, the question of “why” is essential; as in, “Why would someone want to undertake a program evaluation?” This question is especially important for those programs that are not in academic settings (e.g., the program is working within the auspices of a nonprofit organization), as the investment into evaluation may seem dauntingly large—a program would need the personnel resources in order to complete the evaluation, either by hiring an external evaluator or using an internal one, which in turn requires financial and time resources. However, more and more grant-giving agencies and organizations are requiring some form of evaluation in order to show the “results” stemming from their investment (Weiss, 1998) as well as to keep programs accountable for outcomes (Jacobs, 2003; Newcomer, Hatry, & Wholey, 1994). As such, people who want to implement a virtual world program—for example, in a school or classroom, in an after-school program—and who need external funding in order to support the program, will need a framework and technique for evaluating their program.

Other reasons to engage in program evaluation include: “midcourse corrections;” continuing, expanding, or instutionalizing the program; cutting, ending, or abandoning it; testing a new program idea; choosing the best of several alternatives; or deciding whether to continue funding (Weiss, 1998). Jacobs and Kapuscik (2000) provided a “top ten” list of reasons for conducting an evaluation; some pertinent reasons for virtual world programs include meeting demands for accountability, obtaining initial or continued funding, gathering feedback from participants on the program, determining program changes that would improve the quality of the program, and adding to knowledge learned through the program. Often, however, the reason for program evaluation is simple; the authors also wrote: “Many programs initiate evaluations for one simple reason: they are required to” (p. 5). I have included program evaluation as an essential part of this framework because it is often difficult to plan evaluation in retrospect, especially when it comes to data collection in virtual worlds (as discussed in more detail below). Therefore, even if programs are “required to” complete an evaluation, perhaps some of the ideas presented in this study will aid them in completing this endeavor. In addition, perhaps if program stakeholders are able to think of their evaluation needs during the design phase of their program and to understand the benefits evaluation activities can bring to their program, rather than feeling like they *have* to complete an evaluation, they will *want* to, and in turn be excited to implement the results into their program and share the results with other programs.

Ideally, program evaluation should be an integral consideration during the design and implementation of a virtual world program. I have attempted to address the "why" regarding program evaluation, which leads to the next important question—"how?" Before discussing evaluation approaches, however, I want to first focus on the challenges of evaluating a virtual world program, as these challenges in turn affect the type of approach best used in this context.

Challenges to evaluation in a virtual world program. I believe that there are potentially three major challenges to the evaluation of virtual world programs: the non-formality of the setting, the means by which data is collected, and the need for self-evaluation.

Nonformal educational settings. The first challenge is that most likely, the virtual world program will be implemented in a nonformal education setting, such as community-based organizations, after-school programs, museums, libraries, etc. (Norland, 2005). In describing challenges facing evaluators in nonformal settings, Norland (2005) provided five key characteristics of nonformal education settings:

1. "*Focus:* emphasis on learning

2. *Curriculum***:** options, variety, flexibility; often determined by learners
3. *Relationships***:** facilitator-learner informal relationships
4. *Resources***:** often local
5. *Time orientation:* immediate
6. *Structure:* low structure often desirable." (p. 3)

In comparing these six characteristics to the context of the ClubZora project, for example, it is clear that it was indeed a nonformal educational setting. While some programs could be implemented within a very structured classroom environment, it is likely the program would not be an integral part of the day-to-day experience of the students, nor would it be sustained throughout the entire academic year, and therefore it would face similar challenges for evaluation. These challenges correspond to differences in participant exposure to the program, collaboration between organizations, and the non-compulsory nature of the program.

Unlike in formal education settings such as schools, participants may not have consistent, continuous, or repeated exposure to the program when held within the context of a nonformal setting. At one extreme, participants may be engaged with the program for one visit lasting a short time or at the other extreme, for many significant lengths of time for a long duration (Norland, 2005). In looking at the ClubZora project, this was a definite challenge—if participant attendance at the Clubhouse was inconsistent, it would only follow the use of the Zora software would also be inconsistent.

Another challenge to evaluation of programs within a nonformal setting is that the program may be

> developed and offered by organizations other than traditional education institutions. Many times, this organization is a newly created collaboration of multiple organizations from the public, nonprofit, or private sectors. Even when a school district or other formal education provider is one of the partners, representatives from the other organizations may be influencing decisions about the program. (Norland, 2005, p. 10)

Even if the organization running the program is not an “official” collaboration between other entities, the possibility exists that the program is working within the contexts of another organization; for example, the DevTech Research Group was running the ClubZora project within the Intel Computer Clubhouse Network. This requires the program to be respectful of the host organization and to work within its context and framework; this could be a challenge to both program design and evaluation.

A third challenge to evaluation within a nonformal setting, as described by Wiltz (2005), is that “nonformal environmental education programs often take place in a leisure setting. Their participants are noncaptive learners, directing their own course of study and often viewing their participation in terms of recreation as opposed to education” (p. 18). Therefore, the program is a supplementary educational experience, not one that is required, as school is. As such, participants will engage in the program for a variety of personal reasons, and therefore participants will have a wide diversity of backgrounds and life experiences (Wiltz, 2005). This was also true of the ClubZora project—as the Computer Clubhouse was a voluntary after-school opportunity, and because there was no set curriculum for the activities in which members had to engage, members could participate in the Clubhouses, and in turn any available project, for an assortment of motives. This challenge may not be one for all programs; for example, a virtual world program may be implemented within a classroom in order to teach a particular subject (e.g., science), and therefore all students may be required to participate and complete program activities. However, as there is the potential that this challenge will be true within the setting of a virtual world program, I felt it was important to acknowledge and include.

Data collection. The second major challenge to evaluation within a virtual world program is data collection; as data are the key element to evaluation, challenges to data collection in turn challenge evaluation. One of the first difficulties in data collection in a virtual world program relates to the nonformality of the setting, as described above, and the potential for participants to have varying amounts of exposure to the program due to not attending on regular basis. Of this challenge Christensen, Nielson, Rogers, and Volkov (2005) wrote:

> Contributing to the difficulty of evaluating drop-in programs is the fact that program staff may not have the capacity or the systems to track participation or even to maintain accurate databases with contact information. As a result, ongoing evaluation input from participants may

> be unavailable, necessitating full data collection with each learning episode. (p. 74)

In addition, the authors noted that the “drop-in” nature of some programs may result in difficultly in ensuring meaningful interactions between participants. Again, while not all virtual world programs will face the challenge of treatment “dose,” those that do will have to consider how to collect enough data, and the “correct” data, when participants are engaged in the program, so that they can use these data for the evaluation of the program.

A second difficultly regarding data collection in a virtual world program is the technology itself. While not all of the program activities must be completed within the virtual world, many, if not all (as in the case of ClubZora), activities will be. Therefore, there must be a means by which to gather data from the software. This ability to access data from the software will vary based on the level to which the program is involved with the creation of the software itself and/or the licensing agreements of the software when purchased. For example, the DevTech Research Group designed the Zora software, and therefore was able to add data-collection instruments naively into its operation. However, because Zora was based on the ActiveWorlds platform and a particular license agreement, there was still a limit to what data the researchers were allowed to access; for example, the researchers were unable to gather data regarding avatars’ movements within the world as coordinates (i.e., for tracking). There are, of course, other means by which program stakeholders could collect data from their program, for example, through program-related materials, such as participant questionnaires (online or on paper), interviews, field notes from mentors, etc. Creative approaches to data collection may be required in virtual world programs; Christensen et al. (2005) describes some examples of other forms of creative data collection techniques in nonformal education settings, such as "kiddie focus groups," archival data, and Post-it surveys. Additional analysis methodologies for virtual worlds will be described in Chapter 6.

A third difficulty regarding data collection relates to the types of data collected. While traditional evaluation data can be collected, such as interviews, surveys, demographic data, usage data, etc., new forms of data can, and should, be collected from the virtual world. Examples include screenshots of buildings and; messages left on bulletin boards; chat logs; videos that are recorded while walking through the world via screenshot software; and "birds-eye-view" maps of the world, based on logs of objects. In addition, interviews, focus groups, and observations can also occur virtually, requiring new modes of both implementation (i.e., how does one conduct a virtual interview?) and documentation (i.e., how does one actually document the content of the interview?). (Types of data for program evaluation in a virtual world will be discussed in Chapter 6.)

A fourth difficulty of data collection in a virtual world program may at first seem counter-intuitive—the challenge of *too* much data. This is also a common critique of design-based research (Dede, 2004) and this will be discussed as a limitation of this study in Chapter 8. If the program administration chooses to gather information via the virtual world software itself, so much data might be recorded that “sorting through” it all would not only be an impossible task, but also may not produce useful information (i.e., a raw log that contained just the timestamps of when people logged in and out of the software would not be helpful). Instead, this data would need to be parsed into more useful, and smaller, pieces of data, such as average total time logged into to the program by user. This could be done via a log parser, as with the ClubZora project. However, not all programs would have access to this technology, as the parser for this project was custom-built. Therefore, the data collected should be done in a meaningful way, in order to answer the evaluation questions, and so that the potential for using the data for evaluation is not so daunting!

Need for self-evaluation. Unlike other social programs which have both large numbers of participants and high stakes (i.e., Head Start programs), and therefore require evaluations to be completed by knowledgeable and credible evaluators (either internal or external), as virtual world programs are small in number and relatively small in participation, it most likely requires that the program staff complete the evaluation on their own, or if they are able to engage the help of a knowledgeable evaluator (which I do recommend), it may be only for a limited number of hours. As such, the program administrators may need to be the primary designers, implementers, and analyzers of the evaluation. The evaluation approach for virtual world programs, then, must be accessible to program staff who may not have in-depth knowledge of or experience with evaluation methods.

Program evaluation approaches. There appears to be minimal application of traditional program evaluation techniques to virtual world programs. Therefore, one of the research questions guiding this dissertation is “How should virtual world programs for youth be evaluated?” There are several evaluation approaches available, including but not limited to process evaluation, outcome evaluation, theory-driven evaluation, goal-free/needs-based evaluation, quality assurance assessment, cost-benefit evaluation, cost-effectiveness evaluation, meta-evaluation, utilization-focused evaluation, and participatory evaluation (Jacobs & Kapuscik, 2000). In general, though, evaluation approaches fall into one of two categories: process evaluations (also called implementation or formative evaluations) and outcome evaluations (also called impact or summative evaluations) (Jacobs & Kapuscik, 2000; Weiss, 1998).

While researching evaluation approaches for this study, and in order to guide my selection of evaluation approaches for this study, I consulted Stufflebeam (2001), as he examined 22 of the most common evaluation approaches, accessing them along a variety of categories, including main purposes served, questions that are typical of that approach, and strengths and weaknesses of the approach. He also compared them to professional evaluation standards, as set forth in the *Program Evaluation Standards* by the Joint Committee on Standards for Educational Evaluation (1994) in order to characterize them as *Poor, Fair, Good, Very Good,* or *Excellent*.

In each of the categories of Evaluation Purposes, Evaluation Questions, and Evaluation Methods, I selected the items that were most appropriate to virtual world program evaluation, at least in the current state of their history (Table 4). For each item, he recommended one or more appropriate methods; I tabulated all of the items and four methods that came to the forefront were *management information systems*, *case study*, *program theory-based*, and *mixed methods*.

Table 4

Items Selected for Evaluation Purposes, Evaluation Questions*, and* Evaluation Methods *per Stufflebeam (2001) in Order to Determine the Most Appropriate Evaluation Approaches for Virtual World Programs.*

Evaluation Purposes

- Determine whether program objectives were achieved
- Direction for program improvement
- Inform management decisions and actions
- Provide balanced information on strengths and weaknesses
- Describe and critically appraise a program

Evaluation Questions

- To what extent was each program objective achieved?
- Are program activities being implemented according to schedule, budget, and expected results?
- Is the program sustainable and transportable?
- Is the program worthy of continuation and/or dissemination?
- How has the program evolved over time?
- What were the most important reasons for the program's success or failure?
- What changes in the program's design or implementation might produce better outcomes?
- What program features are essential for successful replication?

Evaluation Methods

- Criterion-referenced tests
- Computerized or other database
- Analysis of archives
- Collection of artifacts
- Log diaries
- Content analysis
- Independent and participant observers
- Interviews
- Questionnaires
- In-depth descriptions
- Photographs

Note: Adapted from "Evaluation Models" by D. L. Stufflebeam, 2001, *New Directions for Evaluation, 89*, 7-98, Tables 1 through 4.

Using these suggestions as starting points, I investiaged each in more detail. Further examination of the features, challenges, and limitations of each of approach suggested that the case study approach was best suited to the evaluation of virtual world programs.

Stufflebeam (2001) describes key aspects of a case study approach:

> Program evaluation that is based on a case study is a focused, in-depth description, analysis, and synthesis of a particular program or other object . . . The study looks at the program in its geographic, cultural, organizational, and historical contexts, closely examining its internal operations and how it uses inputs and processes to produce outcomes. It examines a wide range of intended and unexpected outcomes. . . . It employs multiple methods to obtain and integrate multiple sources of information. (p. 34)

Of particular note is the fact that a case study approach allows for use of a variety of data sources, qualitative and quantitative, innovative and traditional, which is ideal for virtual worlds. When compared to the Joint Committee *Program Evaluation Standards*, the case study approach was regarded overall as “very good” (Stufflebeam, 2001). Of course, no approach is perfect; the strengths and weaknesses of a case study approach to virtual world programs are illustrated in Table 5, as illuminated by Stufflebeam (2001).

Table 5

Strengths and Weaknesses of a Case Study Evaluation Approach, per Stufflebeam (2001), for Virtual World Programs.

Strengths

- Can focus on audience's most important questions
- Triangulates findings from multiple sources
- Strong provision for analyzing qualitative information
- Considers contextual influences
- Examines program's internal workings and how it produces outcomes
- Can be done retrospectively or in real time
- Employs rules of evidence
- Requires no controls of treatments and participants
- Examines programs as they naturally occur
- Examines programs holistically and in depth
- Employs all relevant information sources and methods
- Stresses complementarity of qualitative and quantitative methods

Weaknesses

- May provide too narrow an information basis for judging a program's merit and worth
- Investigators may mistake the approach's openness and lack of controls as license to ignore rigor

Note: Adapted from "Evaluation Models" by D. L. Stufflebeam, 2001, *New Directions for Evaluation, 89*, 7-98, Tables 5 and 6.

In addition to these strengths and weaknesses, there are two characteristics where a case study approach does not apply to virtual world programs, at least in the way in which I am envisioning program evaluation in this context to occur. First, of a case study approach, Stufflebeam (2001) stated: "The investigators do not control the program in any way" and second, "the main thrust of the case study approach is to delineate and illuminate a program, not necessarily to guide its development or to assess and judge its merit and worth" (p. 34). Regarding the first, as stated in the challenges above, it is unlikely that a virtual world program would be able to engage the services of an evaluator outside the program for extended periods of time and therefore the evaluator is most likely part of the design team. As such, the evaluator may have some measure of control over the development of the program, especially in light of the evaluation results. For this reason, I believe that an additional, secondary approach—self-evaluation—in combination with a case study approach, should be considered.

According to Fetterman (2001), self-evaluation is "designed to help people help themselves . . .Program participants—including clients—conduct their own evaluations; an outside evaluator often serves as a coach or additional facilitator depending on program capabilities" (p. 3). Usher (2000) described four characteristics of self-evaluation: (a) it is a partnership, (b) it is designed to be practical, (c) it is better considered a process than a product, and (d) it lends itself to several kinds of evaluation efforts (p. 11). A benefit of self-evaluation that is particularly applicable to virtual world programs, as stated by Usher (1995), is that

> by developing the capacity to monitor and assess their own performance, program managers and staff can risk the mistakes that often occur with innovation. This is because they can detect problems and make mid-course corrections before the results of errors due to planning *or* execution become widely apparent and costly. (p. 62-63)

As virtual world programs are innovative, and fairly new, this ability to understand the status of the program as it is underway is extremely beneficial. The application of these two evaluation approaches to virtual world programs will be explained in detail in Chapter 6.

Development of the Attribute Framework. As described in Chapters 2 and 3, I was deeply involved in two virtual world programs—VCLC at Children's Hospital Boston and ClubZora. Despite the best conceived plans, grounded in thorough examination of pertinent literature, for each of the projects prior to their start, the implementation methods of the programs were new to the research teams and hence the pilot nature of each project. During these experiences, we found many of our plans to be successful, but we also encountered stumbling-blocks and unexpected challenges.

As we continuously examined, tested, and refined our understandings of the implementation of virtual world programs, per the core methodological approach of DBR, I began to notice that both the success and challenges that we encountered could be grouped into categories. For example, the curriculum that we developed for the VCLC project was based on our goal of increasing medical adherence amongst the participants—the *purpose* of the program. The evaluation measures that participants completed during the projects were related to this desired outcome, and therefore we were able to examine the ways in which this virtual intervention impacted medical adherence. This concrete purpose was clear to participants from the start of program and was embedded in all aspects of the program, including the types of buildings created and in the virtual and face-to-face activities. In contrast, the ClubZora program did not have as distinct of a purpose; instead, the purpose was to create a community of users, partially by showcasing projects created in the Clubhouse, a much more nebulous and less concrete purpose. Various sources of data, such as informal feedback surveys, email communications from participants, and the chat logs, indicated that participants did not fully understand the purpose of the project, and this was reflected in their use of the virtual world.

Furthermore, in comparing and contrasting the implementation of the two programs, I began to reflect on the essential components of a successful virtual world program. For example, in both projects, *communication* was a key aspect, whether it be via the chat system, email, or snail mail. If we had not been able to communicate with participants, there would not have been a program. As another example, there would be times when a lot of youth were online simultaneously and other times when very few would be on; we found that the more youth that *participated* in the program, the more excited the youth would be and the more involved they would become.

After the conclusion of the VCLC project, I began to devise the attribute framework. Throughout the ClubZora project, I was further able to compare differences in the implementation of these two projects and then categorize into the attributes. For example, the forms of adult interactions in the two projects were very different, resulting in not only different modes of implementation but also different types of outcomes. I examined literature relating to the importance of strong adult relationships in relation to the concept of positive youth development, including resources from the nonprofit organization MENTOR. My realization that the importance of determining the amount and modes by which adults interacted in the program led to the development of the attribute of mentorship. In addition, throughout the two projects, I examined available literature related to virtual worlds. Based on the data derived from the VCLC project, the ClubZora project, and key literature, I devised the attribute framework (see Table 6).

I originally considered several additional concepts as attributes, but did not include them in the framework; these concepts included *learning*, *games*, and *virtual communities*. I did not include learning, however, because not all virtual world programs are enacted with learning as a core purpose. In this context, by learning I mean learning of academic-like subjects, such as science, math, history, etc. ClubZora is an example of a program in which a traditional school subject is not a fundamental purpose, unlike, for example, River City or Quest Atlantis. However, the potential for learning to be a function of a virtual world program is very important, and hence why it is subsumed under the more general attribute of purpose.

I also initially considered games to be an attribute in the framework, as many, if not all, of the most popular stand-alone virtual worlds for preadolescents are comprised of games, which is a potential indicator of their importance as a feature of virtual world software. However, as Bartle (2004) indicated, virtual worlds should be considered environments in which games can be played, not games themselves. In concert with the myriad of literature about the importance of play to children's development, rather than include games as their own attribute, I felt a more appropriate attribute would be *play*, as this could include the possibility for games, as well as other modes of play.

Finally, I considered the concept of a virtual community as an attribute. Upon further examination of the data from the two projects as well as the available literature, it became clear that not all virtual world programs are meant to be a tool to support the development of a virtual community amongst members. Instead, as a program can choose whether the formation of a community is a function of the program, it is more accurate to consider the creation of a virtual community as a potential purpose of a program.

Table 6.

Data from the VCLC at Children's Hospital Boston and ClubZora Projects as well as Key Literature that Informed the Creation of the Attribute Framework.

Attribute	Data from VCLC at CHB	Data from ClubZora	Key Literature
Purpose	• Activity curriculum • Evaluation outcome measures • Needs of pediatric post-transplant population, as identified by CHB medical staff and corresponding research literature	• Informal survey feedback from participants and Clubhouse members and staff • Directives from Clubhouse Network administration • Suggestions from Clubhouse staff (e.g., creation of Teen Summit area to highlight videos created for the event) • Feedback from Clubhouse staff at annual Coordinator conferences	• Preece and Maloney-Krichmar (2003) • Barab, MaKinster et al., (2004): virtual communities

Attribute	Data from VCLC at CHB	Data from ClubZora	Key Literature
Communication	• Chat logs from Zora • Email communications with participants, parents, medical staff, etc. • Face-to-face and telephone interviews with participants and families	• Chat logs from Zora • Email communications with participants, parents, Clubhouse staff, etc. • Presentations by ClubZora project administrator at Clubhouse events (e.g., annual Coordinator conference, Teen Summit) • Visits by Zora Ambassadors to local Clubhouses	• Preece and Maloney-Krichmar (2003) • Watson (1997) • Subrahmanyam and Greenfield (2008)
Participation	• Zora usage log data (logins, time online, lines of chat, number of objects created)	• Zora usage log data (logins, time online, lines of chat, number of objects created)	• Markus (1987): Critical mass theory • Preece (2000; 2001) • Kendall (2003) • Lave and Wenger (1991): Legitimate peripheral participation

Attribute	**Data from VCLC at CHB**	**Data from ClubZora**	**Key Literature**
Play	• Participant observation by research team • Chat logs • Screenshots and video captures of the world	• Participant observation by research team • Chat logs • Screenshots and video captures of the world	• Piaget (1932) • Scarlett, Naueau, Salonius-Pasternak, and Ponte (2005)
Artifacts	• Prop dump files • Zora usage log data • Screenshots and video captures of the world	• Prop dump files • Zora usage log data • Screenshots and video captures of the world	• Piaget (1923/1926, 1929/1951); Piaget & Inhelder (1969) • Papert (1980; 1999)
Policies	• Research requirements set forth by CHB • Tufts University IRB regulations • *VCLC Zora Code of Conduct*	• *Computer Clubhouse Code of Conduct*, which includes the *Computer Clubhouse Internet Safety Guidelines*, the *Computer Clubhouse Software Policy*, and the *Computer Clubhouse Copyright Policy* • Tufts University IRB regulations • *ClubZora Code of Conduct*	• Statutes of the Children's Online Privacy Protection Act (COPPA) • Federal Trade Commission's report to Congress: *Virtual Worlds and Kids: Mapping the Risks* (2009, December) • Preece (2000)

Attribute	**Data from VCLC at CHB**	**Data from ClubZora**	**Key Literature**
Mentorship	• Face-to-face interviews with participants and families • Visits to CHB with participants • Participant observation in Zora, as reflected in the mentor field notes	• *ClubZora Online Mentor Guide* • Participant observation in Zora, as reflected in the mentor field notes	• Dubois and Karcher (2005) • Lerner (2004); Lerner, Brittian, and Fay (2007) • Cantrell, Fischer, Bouzaher, and Bers (2010): e-mentorship in virtual worlds • Resources from the nonprofit organization MENTOR

Virtual world programs are resplendent with challenges, due to the nature of the two contexts—the face-to-face and the virtual—within which they operate. In addition, the technological tool, the virtual world software, further increases the complexity of the design and implementation of these programs. Therefore, the research approaches used to understand virtual world programs have to be adaptable in order to accommodate their intricacy. Design-based research, one such approach, was utilized in order to develop the Zora software and ClubZora project; I then applied DBR to the creation of a framework for the design and evaluation of virtual world programs. A key component of understanding virtual world programs can be—I would argue *should be*—done via evaluation activities, which in turn inform the design of programs. The process of testing, refining, and reimplementing based on challenges during implementation, using the principles of design-based research, resulted in the seven attributes—purpose, communication, participation, play, artifacts, policies, and mentorship—that comprise the framework presented in this dissertation study.

Chapter 4: Results

In the previous chapters, I have provided the problem statement, motivation, and research questions guiding this study. I have also examined the literature pertaining to technology use and youth, virtual worlds, preadolescent development, and virtual world programs. In addition, I outlined the context of the study—the ClubZora project—as well as the methods of the study, including design-based research and program evaluation. In this chapter I describe the results of the study—seven attributes that when considered together provide a framework for the design and evaluation of virtual world programs. Each of the seven attributes—purpose, communication, participation, play, artifacts, policies, and mentorship—are described. In Chapter 2, I described key aspects of preadolescent development at a general level. In this chapter, I will tie each of the attributes to a specific aspect of preadolescent development.

Attribute 1: Purpose

Description of the Attribute of Purpose. The attribute of purpose, at the most general level, refers to the reason, or reasons, why a youth would want to use the software and participate in the program, initially and throughout its duration. The purpose also relates to the intent and goals of the program, though these may differ based on audience (e.g., program developers, users, etc.) and program component (e.g., software, curriculum, etc.). Regardless, a clear definition of the purposes of a virtual world program allows users to immediately understand the goals of that program (Preece & Maloney-Krichmar, 2003), which in turn impacts participation in the project.

Purpose is especially important for virtual world programs for youth, since these programs can attract various ages and types of youth for different reasons, per the nonformality of the educational setting. Purpose can range from the simple, such as virtual worlds whose main function is to allow youth to play games with each other (i.e., stand-alone virtual worlds), to the complex, such as virtual world programs designed for learning a specific content area, such a history or science (Andreatos, 2007; Barab, Kling et al., 2004; Barab, Thomas et al., 2005; Corbit, 2002; C. P. Lim, Nonis, & Hedberg, 2006). There can also be several “levels” of purpose in a virtual world; for example, a purpose for newly-joined members may be to just play games and earn points while a purpose for more experienced members may be to have them reach out to the new users and guide them through the world. Designers of virtual world programs should ensure that the purpose of the virtual world is clear, both when members first join the world and as they become more experienced.

More specifically, purpose must relate to four components: (1) supporting the development of the youth participating in the program, (2) the explicit goals, intentions, and outcomes of the program, (3) the development of a virtual community, and (4) the profit model, openness, and regulation of the world.

Purpose as related to supporting the development of preadolescents. One of the main purposes of any virtual world program should be to support youth’s development in an appropriate manner. As described in Chapter 2, preadolescence is a time in which important cognitive and social changes are emerging, such as increased connections to peer groups. Unlike the other attributes, the attribute of purpose does not directly correspond to a particular set of developmental tasks that can be supported with a virtual world program; rather, *I believe that the purpose of virtual world programs should be to support youth development along a variety of dimensions by an array of means*. By understanding the key tasks of preadolescent development, designers can create a program that can support this development in a meaningful way. One step towards this understanding is examining the remaining six attributes presented below, as each is tied to a specific aspect of preadolescent development.

Purpose as related to the desired outcomes of the virtual world program. This component of purpose—purpose as indicated by the goals, intentions, and outcomes of the virtual world program—is likely to be the most explicitly understood component of purpose for a program. For example, the main purpose of the VCLC project at Children's Hospital Boston was to increase medical adherence among youth participating in the program. The main purpose of the ClubZora project was to provide a space for members of the Clubhouses to share their work and to meet other members, in order to create a stronger community of members across the network. The most salient purpose of Neopets is to create and care for a virtual pet; purchasing items to care for the pet comes from playing games. In the virtual world program Quest Atlantis, the purpose depends on the particular educational quest on which the user embarks. The CyberCiv program "connects students' imaginations to the 6th grade social studies curriculum with virtual travel through Mesopotamia, Ancient Egypt, Greece, Rome and the Middle Ages" (GST BOCES, 2010b, para. 1) while SciFair, a virtual science fair, engages “teams of middle school students, teachers, college students and professionals from the local business community [who] form teams to design and build a virtual world to educate others about a science topic” (GST BOCES, 2010b, para. 3).

The goals and outcomes of a virtual world program are often the easiest to evaluate and measure, because they are often tied to an explicit metric. For example, if a virtual world program was designed to increase participants’ understanding of a historical event, then evaluation measures could be given before and after the program to measure change in knowledge about the event.

Creation of a virtual community as a purpose of a virtual world program. As defined in Chapter 2, a virtual community and a virtual world are not the same, despite the fact that the terms are often used interchangeably. In this work, I consider the creation of a virtual community to be a potential *purpose* of a virtual world program. As defined previously, a virtual community is “a persistent, sustained social network of individuals who share and develop an overlapping knowledge base, set of beliefs, values, history, and experiences focused on a common practice and/or mutual enterprise” (Barab, MaKinster et al., 2004, p. 55). Because there is so much interest in virtual communities, it is important to highlight this component of purpose explicitly. Designers of virtual world programs must, from the outset, decide whether or not their program will be used to support the creation of a virtual community, as this decision results in different design and implementation strategies. If designers hope to form a virtual community within the virtual world program, then they must consider whether the community is one of bridging or one of bonding.

"Bridging communities" bring together disparate members who have not met in real life, while "bonding communities" reinforce already-established networks of people. The distinction between these two concepts is not dichotomous; rather, it is more of a continuum, because often a community can have aspects of both but have closer ties to one type (Norris, 2004). For example, one may create a virtual world program for which one purpose is to create a virtual community for children who are being treated for a particular chronic illness (Bers et al., 2007; Bers et al., 2001). A bridging virtual community may be one in which youth from all over the United States are invited to join, though they may have never met each other. A bonding virtual community, however, may be one in which only patients from a particular hospital who have already been meeting for face-to-face support groups are invited, allowing them to connect outside of the scheduled meetings (Bers et al., 2003). In both cases, the community could evolve to serve both a bridging and bonding function. When developing a virtual community for youth, careful thought should be given to these two types of communities as the decision greatly influences the purpose of the world and hence its design.

Profit model, openness, and regulation as related to purpose. Plant (2004) provided a three-dimensional model for categorizing virtual communities based on "the degree of community regulation, the degree of community openness to membership and the degree to which the community is involved in for-profit activities" (p. 57). He described the characteristics of unregulated communities:

(1) For-profit, open, and regulated communities;

(2) For-profit, private, and regulated communities;

(3) Not-for-profit, open, and regulated communities;

(4) Not-for-profit, private, and regulated communities; and

(5) Communities which are a mixture.

While I do not believe that this taxonomy is directly applicable to virtual world programs for youth, it certainly raises interesting questions about purpose. When developing virtual world programs for youth two key issues need to be taken into consideration regarding purpose: (1) whether the world (or part of the world experience) has a fee associated, and (2) openness of the world (e.g., criteria for joining the program may be based on age, a specific type of population, a particular location or organization, etc.).

For example, some virtual worlds for youth are free to use, some require payment or purchase of a toy, and some are a combination (some aspects of the world are free, others must be paid for). While this is not quite the for-profit/not-for-profit distinction Plant was making, as he was referring to the organizations that ran the communities, the important takeaway is that designers need to consider whether fees will be required to participate in all or some of the world.

Designers of virtual world programs for children should carefully consider the inclusion of monetary components. Elkind, in his book *The Hurried Child: Growing Up Too Fast Too Soon* (Elkind, 1981/2001), wrote:

> Children in the United States today influence the spending of $500 billion each year and are bombarded with commercials for products that range from violent toys to junk food. Children are much less able to recognize commercials than adolescents and adults, and, therefore, are more influenced by them; advertisers hurry children into psychologically and nutritionally unhealthy consumerism. (p. 86)

As described briefly in Chapter 2 and again in Chapter 8, the role of advertising within virtual worlds needs to be examined in more depth, for as KZero Worldswide (2010b) stated: “Just as every major toy and TV programme [*sic*] has its own website, we expect them to have their own virtual world” (p. 3).[28] As many child-oriented marketing techniques have shown, youth today have great buying power. However, their increased vulnerability means that consumerism can be both cognitively and physically harmful to youth.

For some virtual world programs, the purpose of the world is based on the population for whom the world was designed. For example, some communities for youth are open to anyone of a particular age, such as Neopets, while others are regulated to only members of a particular group, such as teenage post-transplant patients from a particular hospital (Bers et al., 2007; Bers et al., 2001). This is important in much the same way that playgrounds in real life are often divided into different areas for children of different ages to play. By providing a safe, monitored “playground” that is created appropriately for a particular age or a

[28] See Wollslager (2009) for a description of the advertising avenues within Neopets and children’s ability to recognize the advertising as such.

particular population, youth are more likely to be interested and to have a positive experience.

Attribute 2: Communication

Description of the Attribute of Communication. The attribute of communication is defined as the means by which users of the program communicate with each other and with administrators of the program. Communication can be electronic (e.g., via the virtual world's chat/messaging system, email, messaging-capable artifacts, etc.), face-to-face (e.g., during face-to-face interactions), or printed (e.g., curriculum materials).

Electronic communication in a virtual world can take many forms depending on the features of the technology itself (i.e., the exact means by which people communicate can vary). In general, though, there are two main types of communication within a virtual world: synchronous and asynchronous. Synchronous communication occurs when users are online at the same time, as in the case of a chat system. Asynchronous communication occurs when users are not online at the same time; rather, they may, for example, leave messages for each other on bulletin boards or send emails (Preece & Maloney-Krichmar, 2003). Traditionally, means of communication within virtual worlds are text-based. However, new methods of communication are being developed. As easily-accessible video-creating and video-hosting technologies (such as YouTube) become more and more popular, communication via video is also a possibility (by real-time, synchronous video or by asynchronous video).

Communication is especially important in virtual world programs in which the purpose of the program is to create a virtual community. The terms *community* and *communication* share the Latin root *communis*, which means common—thus it is not surprising that they mutually impact each other. As Watson (1997) wrote, “Without ongoing communication among its participants, a community dissolves. Communication is therefore vital to communities both online and off. . . . Communication creates, re-creates, and maintains community through the continued interaction of participating members” (p. 104). Therefore, designers need to carefully consider communication mechanisms when creating a virtual world programs in which the development of a community is a key purpose.

Connection of the Attribute of Communication to the development of preadolescents. For preadolescents, communication serves the purpose of aiding in the establishment of interpersonal connections. Online communication is just one means to fulfill this purpose. Preadolescents use online communication tools such as instant messaging and social networking sites “to reinforce existing relationships, both friendships and romantic relationships, and to check out the potential of new entrants into their offline world” (Subrahmanyam & Greenfield, 2008, p. 120). As members of this age group are beginning to establish social networks, it is especially important that both asynchronous and synchronous communication be possible in the virtual world. As virtual worlds become increasingly international, youth may have friends in different time zones, or even locally on different schedules, so they should be able to leave messages for friends who are not online at the same time. Also, as will be discussed in more detail in the next chapter, youth should be able to have a list of friends whom they can easily find in the virtual world in order to communicate with them. For example, in Neopets, users can communicate with each other via NeoMail, NeoChat, and message boards.

Attribute 3: Participation

Description of the Attribute of Participation. Though it may seem obvious, the attribute of participation is defined as how users engage in the program. Without participants, a program will fail. Even the best conceived program and the most well-designed virtual world software cannot achieve success without participants. Though written about a virtual community, Kendall’s (2003) statement also applies to virtual world programs:

> For a virtual community to succeed, *its members must spend time online* [emphasis added]. . . . The ability of virtual communities to connect people who cannot practically meet face-to-face provides the motivation in some cases for people to make the time to participate” (p. 1459).

The presence of *people* is one of the three components of sociability as defined by Preece (2000; 2001). As will be described in more detail in Chapter 6, participation can be measured in several ways, including the number of participants (including lurkers—users who may log into the software but do not contribute to the chat or create any artifacts), demographic information, time online etc. Youth participation in virtual world programs can also be informed by the idea of critical mass theory.

Examining critical mass theory is important to understanding how to design a successful virtual world program, especially those in which a virtual community is a main purpose. Critical mass theory in relation to online environments suggests that a particular number of users is needed in order to make the online experience worthwhile. Markus (1987) provides five propositions stemming from critical mass theory regarding how to achieve universal access among participants. In particular, the first, fourth, and fifth propositions are extremely important to the development of virtual world programs for youth:

(1) Proposition 1: “There are only two stable states of interactive medium usage in a community: all or nothing. Either usage will spread to all members of the community (universal access will be achieved) or no one will use the medium (for communications internal to the community), either because no one started using it or because *usage* fell off in the absence of reciprocity.” (p. 500)

(2) Proposition 4: “Having high-interest and high-resource individuals among the early users of an interactive medium is highly favorable to achievement of universal access.” (p. 504)

(3) Proposition 5: “Interventions that increase the overall level of interests and resources within the community will increase the likelihood of universal access.” (p. 504)

These propositions should be important considerations for the design of virtual world programs, and also for the dissemination of the programs (i.e., how is the knowledge of the existence of the virtual world program going to be disseminated to the target population?). In particular, these propositions raise important questions such as, “How can I ensure that the earliest users of the world are interested and then communicate that interest to their peers?” “Is there a particular subset of my target population who would be the best early adopters of this program?” “How can I ensure that I am meeting the interests of a wide array of youth?” However, it is hard to quantify *what* the critical mass for a virtual world for youth will be, as it depends on the purpose of the program. For example, a virtual world program used within a classroom of 20 students in order to teach science concepts may have a critical mass of 20—all students need to participate in order for the program to be successful. On the other hand, a virtual world program that is open to all members of an international organization may require dozens of youth (though more in number, a smaller overall percentage of the total) to be online simultaneously in order to sustain interest.

Connection of the Attribute of Participation to the development of preadolescents. One of the tasks of development for preadolescents is to begin to assume different forms of participation in the adult world. One way to think of this task is in relation to the notion of *legitimate peripheral participation*. Lave and Wenger (1991) wrote of this: “Legitimate peripheral participation provides a way to speak about the relations between newcomers and old-timers, and about activities, identities, artifacts, and communities of knowledge and practice. It concerns the process by which newcomers become part of a community of practice” (p. 29). This is a particularly important concept for virtual world programs whose main purpose is to develop a community amongst participants.

Newcomers to the program are allowed access to the activities of the more experienced members, but have tasks that are shorter and simpler that will eventually teach them the skills needed to become a more experienced member of the community (Lave & Wenger, 2000). For example, in Neopets, new users can easily outfit their Neopet from the several shops available within the community. Eventually, as users become more skilled at navigating the world and the commerce policies, they can create a shop of their own in which they can sell to others.

Unlike the other attributes, participation is difficult to quantify with regard to age, since it is based on many factors, including the program's purpose. Tuukkanen, Iqbal, and Kankaanranta (2010), who examined children's participatory practices in virtual worlds[29], described this ambiguity as such: "Participation simply means 'taking part' but the definition leaves open an essential question 'taking part in what?'. As participation does not take place inside a vacuum (Polat, 2005), we have to define the context of participation" (p. 5). For example, a virtual world program designed for a small and particular group of youth, such as in a specific hospital, may only have a maximum possible population of 50 users, whereas a virtual world program designed to be available to any youth around the world between the ages of 13 and 18 will have a vastly larger population to pull from. Thus the "definition" of participation in each program would look very different. In addition, the expectations for each may be

[29] Tuukkanen et al. (2010) propose a framework of four levels of children's virtual participation: (1) forms of participation, (2) child's role as participant, (3) the role of virtual worlds in the process of participation, and (4) affordances of virtual worlds for children's participation. Integration/expansion of these ideas in the attribute framework presented in this dissertation study is a potential area of future work.

different—in the small program, perhaps being one of only a few other members online at a time is acceptable, whereas in the larger world, thousands of members need to be on simultaneously in order for members to feel that the program is "worth it" (per critical mass theory). While more research in this area needs to be completed, I believe that the definition of participation in a virtual world program has to be internal, based on the population served and its purposes. Although there is an objective "level of participation," which may be measured by number of participants enrolled, number of lines of chat, ratio of lurkers to non-lurkers, etc., *each program needs a clear understanding of the participants' needs in order to understand what participation means for their program*.

In their face-to-face lives, children are part of many types of environments. However, virtual worlds can provide youth with opportunities for participation in two ways that may be difficult to achieve in the real world. First, an appropriately-designed site will allow users to experience legitimate peripheral participation, in which their experience in the community is scaffolded from when they first enter. Second, virtual worlds can allow youth to interact with other youth in a way that would not be possible or practical face-to-face due to geographic constraints; in other words, youth can meet other youth from very different backgrounds, experiences, and locations, allowing for an increased understanding of the global nature of today's world.

Attribute 4: Play

Description of the Attribute of Play. Much like the term *community*, the term *play* does not have one accepted definition; for the purposes of this attribute of virtual worlds for youth, however, play can be defined by what *children see as play*, including "having fun, . . . being with friends, choosing freely, not working, pretending, enacting fantasy and drama, and playing games" (Scarlett et al., 2005, p. 3). S. S. Lim and Clark (2010)

> argue that virtual worlds can be viewed as sites of convergence for children's play in that virtual worlds allow for almost all aspects of children's play to converge, primarily manifested in the:
>
> - convergence of social spheres
> - convergence of play spaces and playthings
> - convergence of cultures
> - convergence of learning experiences. (p. 6)

Play in virtual world programs can take on many forms to support children's development, from interaction with pre-created games, such as those in Neopets, to free-form play devised by participants, such as those that occurred during the ClubZora project. As an example of the former, the Neopets "Game Room" lists over 250 games in which youth can partake. One of the most popular games is called *Kass Basher*, and is described as:

> Kass Basher: An evil villain is standing high above, in his floating citadel of death. He is plotting to destroy your land, so what do you do? Make a plushie that looks like him and hit it with a stick of course!
>
> Kass Basher is the most popular sport in Meridell at the moment (for obvious reasons). To play, grab a plank of wood (or something roughly the same shape), wait for the wind to be in your favour, and press

> the **left mouse button** to send Kass flying. Hitting Kass over large distances may even unlock bonus levels! Good luck! (Neopets, n.d.)

Kass Basher has over 200 million plays; on a single day in January 2011, the game had been played over 330,000 times. As an example of a free-form play, as will be described in more detail in Chapter 7, youth participants in the ClubZora project engaged in role-playing games, hide-and-seek, tag, and chase-games.

Connection of the Attribute of Play to the development of preadolescents.

> *Play is to the child what thinking, planning, and blueprinting are to the adult, a trial universe in which conditions are simplified and methods exploratory, so that past failures can be thought through, expectations tested.* (Erikson, 1964/1994, p. 120)

My reasons for the inclusion of play as a *necessary* attribute of virtual world programs for youth is perhaps the most divergent from the literature about adult virtual worlds, as play for youth serves a very different purpose than for adults—play is an important means by which youth learn and develop. Play is a central aspect of healthy child development and is one of the main features of childhood. Though play may seem important only to young children, play is also an important component of preadolescent development; it just takes on a different form. There are many different types of play theories, including psychoanalytic, such as that of Erikson (1950); cognitive-developmental, such as those of Piaget (1951), Vygotsky (1978), and Bruner (1982); cultural-ecological; and evolutionary and comparative (Scarlett et al., 2005). As children develop cognitively, socially, and emotionally, their play also matures.

In adult virtual worlds, the playing of games may not be seen as a means for development of a community (if that is the purpose) or as a legitimate mode for interaction amongst members; instead it may seem an ancillary and non-essential component to the virtual world. However, for preadolescent youth, virtual world programs need to allow for game-playing, as this mimics their real-life cognitive, social, and emotional development. For these youth, simple games may not suffice long-term as the sole purpose for their involvement in the program, but still may be an integral component of *why* users choose to become part of the program, at least initially.

During preadolescence, games with rules become common (Berk, 2008). Scarlett et al. (2005) wrote:

> When older children do not know each other well, they sometimes choose games with simple rules . . . These offer a safer environment because the potential for disagreement is minimized. Therefore, at the end of late childhood, what may appear to be a regression to simpler games is really an adaptive strategy for playing with relative strangers. Then, as the level of familiarity with other children increases, so too does the complexity of the rules. (p. 79)

These features of childhood, then, are important when thinking about play in virtual worlds designed for preadolescents. Clearly it is important to have games, but there should be games with different types of rules. For children at the beginning of this stage, it is important to have games in which the rules are rigid and clearly defined. However, these games should also be available for children toward the end of this stage as they learn to navigate the world and make friendships. For older children, as they become familiar with the world and other children, there should be games in which collaborative play, with the possibility of adapting the rules to the wishes of the group, should be encouraged.

Another key component to play during this age is the gathering of collections, such as baseball cards. Through collections, youth continue to learn about socialization, as collections are often traded using a rule-based system. In addition, collections allow for continued development of imaginative play, as do board games, video games, and storytelling. For example, in addition to creating and caring for Neopets, there are many games to play in Neopets, such as Kacheek Seek, Turmac Roll, Dice-A-Roo, Sakhmet Solitaire and Faerie Bubbles. Playing the games will earn users points to be able to “buy” additional items for their Neopets. Users can also collect items to help care for their Neopets or sell to others. For preadolescents, the playing of games at a variety of skill levels with a variety of rule types can relate to their purpose for being a part of the virtual world program as play mirrors a child’s real-life development.

Attribute 5: Artifacts

Description of the Attribute of Artifacts. Artifacts are defined as objects created by the users within the world and/or within the program (i.e., users may create virtual objects or "real-life" objects to supplement the virtual experience).[30] For example, in the ClubZora project, users were able to upload photos, videos, and music that they had created within their Clubhouses to the ClubZora world.

Artifacts have an especially important role in virtual world programs in which the development of a virtual community is a purpose. In traditional face-to-face communities, artifacts created by members can help solidify their membership in the community; the same is true of virtual worlds. The creation of artifacts is one way to show participation in the virtual community. In the earliest history of virtual communities, such as Usenet, the artifacts of that community were the recorded and archived conversations that future users could go back and read. In essence, it was a historical record of that community.

Connection of the Attribute of Artifacts to the development of preadolescents. Today's graphic-based virtual worlds provide an outlet for youth to share content that they create with others. User-generated content is becoming an important component of digital media for youth (Shuler, 2007). In fact, the Pew Internet and American Life Project found that nearly two thirds of online teens participated in online content creation (Lenhart et al., 2007). In applying the theoretical concept of constructionism to this trend (Papert, 1980, 1999), one of the foundations upon which the Zora software was developed, it becomes clear that allowing for user-generated content should be an important design feature for online communities of youth, as it engages youth in a learning experience.

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[30] The creation of artifacts in virtual worlds to support adolescent identity development is explored in: Beals, L. (2011). Content creation in virtual worlds to support adolescent identity development. *New Directions for Youth Development.*

Finally, the *Partnership for 21st Century Skills*, a nonprofit organization, describes several information, media, and technology skills, including using "digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy" (Partnership for 21st Century Skills, n.d., para. 1).[31] Thus, affording youth the opportunity to create digital projects can serve two important developmental purposes by allowing: (1) youth who enjoy working with digital media a way to showcase their competency, resulting in higher self-esteem and (2) youth to practice and explore skills that are needed to succeed as adults. In much the same way that children in school create artwork, play music, work on projects, and produce materials they are proud to show off, virtual worlds have the potential to allow youth to create content in ways that give them skills to succeed in today's technology-infused world.

While some previous forms of virtual worlds, such as MOOSE Crossing (Bruckman, 1996), engaged youth in the creation of text-based artifacts, most virtual worlds today engage different forms of graphical objects. For example, in Neopets, children can create a new Neopet, which includes choosing the Neopet's species, gender, and personality (as of November of 2010, over 268 million Neopets had been created). Users can also choose to adopt a Neopet from the Neopet Pound. In the shopping area, a child can even set up his or her own shop to sell things for Neopets. In order to make these shops, Neopets provides a means for youth to learn how to program webpages in HTML with a step-by-step guide

[31] More information about this organization can be found on their website: http://www.p21.org.

(Neopets, 2008). In addition, the site includes information about how to draw, either with paper-and-pencil or with a computer program, Neopets, Petpets, Chokatos, random items, Faeries and an assortment of characters. There are also contests in Neopets, such as poetry contests, in which children can submit original work. Users may also submit content for the weekly electronic newspaper called *The Neopian Times*. Multiples forms of creating objects are provided by the technology. The creation of artifacts serves the developmental need of this age which is the mastery of new skills and the engaging in peer networks.

The artifacts preadolescents create in the virtual world can be complex. Youth can be given concrete choices or they can have complete freedom to create something that reflects themselves as an individual. One aspect of virtual worlds should be to provide the tools and resources necessary for youth to create something personally meaningful that they are excited about sharing with other members of the community.

Attribute 6: Policies

Description of the Attribute of Policies. The attribute of policies is defined as the rules and guidelines for the virtual world program that keep it functioning properly and ensure that participants are safe. For example, a program would have to consider policies regarding language use, bullying behavior, games, etc. Policies are one of the three components of sociability as defined by Preece (2000; Preece & Maloney-Krichmar, 2003), along with people and policies. Preece (2003) described how rules “come to be” in adult virtual communities: the rules can be democratic or they can be set by the developers.

This can be true in virtual world programs, though it is also possible, and perhaps even preferable, that a combination of these two options for rule generation be used. A key to having rules, though, is also to have the means to enforce those rules, which may include moderators or automatic language filters.

Finally, rules are meant to keep a real life community safe and functioning. For example, when they start school, children are introduced to a new set of formal rules—rules about classroom procedures, rules about how to do classroom work, rules about relationships with others and rules about the subject matter (Boostrom, 1991). In addition, as described above, rules allow children of different experience levels or familiarity with each other to play together. This is much the same as in virtual worlds—rules dictate how users can interact in a way that is best for the safety of its members.

Connection of the Attribute of Policies to the development of preadolescents. As an overview of rule development, Piaget described four stages of children's development of rules; this development of rules shows a child's developing sense of morality as well as increased cognitive ability (Damon, 1983). Preschool children straddle the first and second stage. In the first stage, during which time fantasy and make-believe play are common, the child will play idiosyncratically (alone) rather than with other children, and his rules will also be private—he will invent new rules, change the rules, and play as he would like (Damon, 1983; Piaget, 1932). During this stage, a child cannot distinguish his or her own rules and rituals from real moral rules (e.g., do not cheat). Around age 5, the second stage begins. In this stage, according to Piaget, children “regard rules as external to themselves, as ‘handed down from above’ by adults. . . [and] as permanent and sacred, not subject to modification for any reason” (Damon, 1983, p. 185). At this stage children also believe that the rule is more important than human need to change the rule (i.e., moving a starting line in order that younger children could join the race), and that punishment will be inevitable after a wrongdoing (often in the form of a natural catastrophe, such as a branch falling).

As youth are given more freedom within the technology to create unique items and to communicate, more rules and policies are required as well as the means to reinforce them, in order to ensure the safety of the youth and to keep the program functioning properly. At eight years, according to Piaget, the third stage of rules develops. In this stage, children realize that rules are cooperative agreements and thus they can change if agreed upon by all. Unlike in previous stages, children do not tie wrongdoing to physical punishment; instead, they view punishment as a human choice. The fourth stage occurs at around 11 years—during this stage, both political and societal as well as personal and interpersonal issues factor into youth’s decisions, resulting in an ideological mode of moral reasoning. One of the major developmental crises for this age is challenging authority (though younger youth may also feel the same), and thus clear rules need to be stated to justify moderation behavior (Erikson, 1982). For these age groups, a “Code of Conduct” (or similar) is sometimes helpful, but participants should also have the means to add to or modify the Code of Conduct in a democratic fashion. Monitoring of the world in light of the rules and policies is important—this may be done through automatic filters, as for language (but creative ways to get “around” the filters are often found), or through “real person” monitoring. For example, in Neopets, message boards are monitored 24 hours a day in addition to filters to help stop offensive messages from being posted.

Developmentally, rules are important components of social interactions, including during play, at home, and at school. Complex rule systems, though, require higher-level cognitive processing, which is why for young children, rules are often very simple. Older children are able to keep in mind the long-term requirements of a task in front of them, while pursuing other short-term goals and simultaneously taking the perspective of others. Thus, older children are better able to work with and understand complex rule systems (Cole & Cole, 2001). Furthermore, as children develop, participation in rule-based games allows for more children to play together for longer periods of time on their own self-initiative as they are capable of using social rules to regulate their behavior. Thus for virtual worlds, rules for the community or for games within the world need to be appropriate to the age of the target demographic—older children can have more complicated rules while younger children need simple rules. Virtual worlds should have clear rules and policies, both to keep children safe but also to encourage their development as they learn to become full-fledged members of adult communities.

Attribute 7: Mentorship

Description of the Attribute of Mentorship. As with play, there are several definitions of the term *mentor* (DuBois & Karcher, 2005; Haggard, Dougherty, Turban, & Wilbanks, 2011). However, Dubois and Karcher (2005) describes three core elements that are present across definitions: (1) as compared to the mentee, the mentor has more experience or wisdom; (2) the mentee's development is aided by guidance from the mentor; and (3) the mentor and mentee are connected through an emotional bond. Within a virtual world program for youth, I define mentorship more broadly as: the expected types of interactions from adults within the world and program (i.e., the level to which adults are involved). While there may be several means by which adults are involved in the program—for example as program administration—at the most general level, *mentors* in virtual worlds should develop relationships with the youth in order that they can provide instruction and support. More specifically, adult mentors are important figures in virtual world programs, and their influence cuts across all of the previous seven attributes. These mentors are charged with making sure that the *purpose* of the project is known to participants; to encourage, facilitate, and supervise *communication*; to support and champion youth *participation* in the project; to promote, assist, and engage in *play* alongside the youth; to support and provide aid in the creation of *artifacts*; and to monitor, enforce, and facilitate development of the *policies* of the virtual world.

The role of a mentor in a virtual world program can vary depending on the *purpose* of the program. For example, if the purpose of the program is to teach youth about a particular science concept, then the mentor must have the knowledge to engage with youth around this topic. If the purpose of the program is to support medical adherence with a particular population of ill youth, as in the

VCLC project, the mentors have to understand the concept of medical adherence, as well as when to “call for help” if a youth reveals potentially harmful behavior (i.e., a youth tells the mentor that she has not taken her medicine in a week). Guidelines for knowing when an expert needs to be contacted should be embedded within the program’s instructions for mentors.

I would like to note that the attribute of mentorship was an additional one that I added after Beals and Bers (2009) was published, using a design-based research approach. At the conclusion of the ClubZora project, I had time to reflect on the project and juxtapose it to the Virtual Communities of Learning and Care at Children’s Hospital Boston project. One of the startling differences to me was the disparity in the role of adults between the projects. In the VCLC project, the mentors had opportunities to meet the youth participants face-to-face, including meeting their families, and visited the hospital when the participants were in for treatments; these face-to-face interactions were supported and continued as online interactions in the virtual world. In contrast, with the ClubZora project, while initially some of the mentor interactions were face-to-face in the Clubhouse, a majority of the interactions occurred online, with very little knowledge of the “real life” youth who were participating. In addition, VCLC was a very small project, with fewer than a dozen very involved youth, mostly located in Massachusetts (or at least in New England) whereas ClubZora had over 500 participants from around the world. These differences alone required different modes of adult mentorship; for example, the ClubZora project required more mentors who were available across time zones, mentors preferably needed to be bilingual, and the enrollment administration was significantly more complicated and time-consuming.

Connection of the Attribute of Mentorship to the development of preadolescents. A report from the nonprofit organization MENTOR indicates that over three million adults participate in formal, one-on-one relationships with youth (MENTOR, 2005). Rhodes and DuBois suggest that it is one of the “most popular social interventions in American society” (Rhodes & DuBois, 2008, p. 254). While a complete discussion of the role mentors can have in the lives of youth is beyond the scope of this paper, I will address some key highlights as they pertain to virtual world programs and preadolescents specifically.

Mentorship is a key component to the concept of Positive Youth Development (PYD) (Lerner, 2004; Lerner, Brittian, & Fay, 2007). PYD has two ideas at its core: “the belief that young people possess strengths . . . [and] that PYD may be promoted when youth strengths are aligned with the strengths . . . for healthy development present in their ecologies” (Lerner et al., 2007, p. 3). Furthermore, research indicates that PYD may be promoted when mentoring is incorporated into youth development programs (Larson, 2006; Lerner et al., 2007; Theokas & Lerner, 2006). Mentorship is often completed within the context of school-based or community-based programs (Herrera, Sipe, McClanahan, Arbreton, & Pepper, 2000, April). A recent addition to the field of mentorship is the possibility of electronic mentoring (e-mentoring).

E-mentoring occurs through computer-mediated communication, such as email and instant messaging (Shpigelman, Weiss, & Reiter, 2009). Rhodes, Spencer, Saito, and Sipe (2006) describe the potential importance of e-mentoring:

> Many mentors face difficulties arranging a time to travel to their mentees' homes and schools, and missed meetings and premature terminations of relationships are a common hazard in the field. Online mentoring permits mentors and mentees to correspond in a more spontaneous fashion, and can engage a wider range of adults . . . to serve as mentors. (p. 498)

Virtual world programs are thusly important potential avenues for e-mentoring to occur.

Cantrell, Fischer, Bouzaher, and Bers (2010) examined e-mentoring as part of a project that used Zora, called Camp Zora. Camp Zora was a virtual world program which served post-transplant pediatric patients from Children's Hospital Boston and Tufts Floating Hospital for Children (this project was a successor to the VCLC project) (Cantrell & Bers, 2010a, 2010b; Cantrell et al., 2010). One of the purposes of this project was to foster a virtual community amongst participants, and thus mentoring was a key component towards this end. The researchers concluded that in a virtual community, the e-mentor contributed to four main tasks: "(1) being a consistent presence online, (2) initiating the majority of conversations and curricular activities, (3) promoting relationships between other participants, and (4) devoting attention to out-of-world communication" (Cantrell et al., 2010, p. 353). Mentors involved in virtual world programs should be trained regarding best practices for youth mentoring (Lerner et al., 2007), and should be particularly aware of these four tasks as related to virtual world programs.

As mentoring, and thusly e-mentoring, especially within the context of a youth development program, can have an important impact on the positive youth development of preadolescents, it is important for virtual world program designers and administrators to understand and make clear the mentorship model of their program. Over 15 million youth who could especially benefit from mentorship are not in a mentorship relationship (MENTOR, 2005); virtual worlds, through e-mentoring, potentially could increase the number of youth involved in a mentoring relationship due to a decrease in certain barriers to access.

In sum, then, these seven attributes represent a framework; an explaination of the way in which this framework should influence the design and evaluation of virtual world programs follows.

Chapter 5: The Application of the Attribute Framework to the Design of Virtual World Programs for Preadolescents

Designing a virtual world program is a complex undertaking, as it involves consideration not only of the design of the face-to-face component of the program but also the virtual world software. The attribute framework presented above provides a starting point for designers of virtual world programs for youth, as programs for youth have many important considerations that are different than those of adult programs.

I would like to note, however, that though this chapter examines the design of virtual world programs for youth, it does so at a high level; that is, I do not go into the details regarding the programming or technical design of virtual world software, as this is not a technical document. For technical design information, I refer the reader to Richard Bartle's (2004) *Designing Virtual Worlds* as a starting point. Rather, I focus on several (but not all) key issues/considerations that are important when designing virtual world programs for youth.

I would also like to emphasize that designers should not consider the attributes in isolation—the entire framework as whole must be taken into account, as the attributes are closely intertwined with each other. For example, designers must consider not only the mechanisms by which communication occurs (*communication*), but also what content will be allowed in user communications (*policies*). Designers may choose to include *artifacts* that allow for messages to be left for other users (*communication*) or artifacts that provide an opportunity for users to showcase projects made during the program (*purpose*). As another example, program designers must decide what content (*purpose*) mentors (*mentorship*) should discuss with users (*communication*).

Designing for the Attribute of Purpose

Of virtual communities, Kim and Frank (2003) wrote, “When designing an online community, both in the initial blueprinting stage and throughout its implementation, the builder must be able to define the type of community being built, why the community is being built, and whom the community will serve” (p. 1461). This sentiment, however, is equally important when designing virtual world programs—at frequent intervals, the designer should examine these “what, why, and whom” questions. These important questions should be re-asked as the virtual world program grows or detaches itself from the original goals of its developers; in the event a new sense of purpose emerges, the designers of the world should ensure the needs of the participants are still being met as intended. At that point, the technological platform that supports the virtual world might need to be modified.

When designing a virtual world program, the purpose of the program should be clearly communicated to participants at the beginning of program and repeated throughout program. The purpose of the program can be conveyed to participants through several means, including: (a) text in the curriculum materials, (b) as a prominent space in the virtual world, or (c) communicated, from within the virtual world (i.e., through the chat system), via email (i.e., messages from the program administration to participants), or in person (i.e., during face-to-face meetings). Prominently displaying and communicating the purpose of the virtual world program is especially important for participants who join the program late and/or if a rolling "admissions" is used. Each of the four components of purpose described in the previous chapter have design considerations as well: (1) supporting the development of the youth participating in the program, (2) the explicit goals, intentions, and outcomes of the program, (3) the development of a virtual community, and (4) the profit model, openness, and regulation of the world..

To support youth development, which should be an important purpose of virtual world programs, designers should root the program in preadolescent development. This information should be a starting point for further exploration about the likes, dislikes, needs, and wants of this particular age. If designing either the program or the software from scratch, it may be helpful to complete a needs assessment in order to understand exactly what the youth would like to see in the program. Designers should engage youth, either in focus groups, one-on-one sessions, or surveys, in helping to design the program as much as possible, as this will help ensure that youth will actually use the program (Jacobs & Kapuscik, 2000).

Pertaining to the design of the virtual world program as related to its explicit goals, the designers need to carefully plan activities (the curriculum) in order to achieve these outcomes. For example, in the VCLC project, one of the intended outcomes was increased medical adherence; therefore, the staff planned activities in the world that would correspond to this goal. One such activity was the building of a pharmacy in which users would create signs and stories about how they remembered to take their medications. Another activity involved a visit from an older transplant patient who chatted with them about how he dealt with his medications at college. Participants should be able to complete some activities independently, regardless of when they log into the software and others with the guidance of a mentor, potentially in a group setting.

If one of the purposes of the program is the formation of a virtual community, the designers need to consider whether the community is one of bridging or bonding (see Chapter 2). For example, if the community is a bridging community, and users will not know each other initially, then the curriculum should include “getting to know you” activities and the software should have the ability for users to create profiles of themselves that are easily accessible to other members. If the community is one of bonding, then the curriculum should include activities that support this goal. The program needs to have ample opportunity for users to communicate with each other, both online and face-to-face (if applicable to the program’s population). Especially with youth, the formation of the community is most likely going to require the facilitation and support of an adult mentor (Cantrell et al., 2010).

Pertaining to openness, if participation in the program is limited to only a certain group, per the *policies* of the program, then safeguards need to be in place in order to ensure that this is the case. For example, for the VCLC project, participation was limited to youth who were being treated at CHB. Child life specialists, nurses, and doctors at CHB gave the VCLC program staff the names and contact information of potential participants so that they could be invited to join the project, rather than an “open call” for participants. For the ClubZora project, participants were limited to members of the Computer Clubhouse Network. In order to ensure that this was the case, members of the Clubhouse had to enroll in ClubZora via an online form located on *The Village*, the Clubhouse’s internal, private website. The ClubZora enrollment form contained a hidden field that was sent with the enrollment request to the ClubZora administrator, who used this field to verify membership, as some youth “found” the enrollment form URL and tried to request access outside of *The Village*. Designers need to carefully consider who will have access to the program and how they will ensure it is limited to only those youth.[32]

Designing for the Attribute of Communication

There are two components to communication that are important to consider when designing virtual world programs for youth: communication between users and communication between users and the program administrators.

Communication between users. One of the main forms of communication in the virtual world program will be between users. Communication can be public—when other users can see each other’s chat, as in a public room—or private—when only the person to whom the communication is

[32] Of course, there is no full-proof way to guarantee that access is limited to a particular population. For example, because the VCLC Zora software was installed on participants home computers, and because a user could choose to save both the login name and password, we were told of situations in which siblings used the software (with and without the knowledge and permission of the participant youth and/or parents). In ClubZora, again because the user name and password could be saved, sometimes a member of the Clubhouse would sign into the software as another user.

directed can see the chat. When considering how the public chat system of the program is designed, designers should consider two aspects: the listening radius and facilitator and user language. The listening radius corresponds to how far away users can be in the world and still be able to “hear” each other. For example, if a small listening radius is set by the designers, users must be very close to each other in order to “hear” chats from the other users. On the other hand, if a very large listening radius is set, then all users, no matter where they are in the world, can “hear” each other. There are positive and negative effects to large and small listening radii. In the case of a small radius, users would be able to gather in a particular area and have a conversation amongst themselves (e.g., if all Spanish speakers wanted to converge at a particular location or if users wanted to talk about a specific topic); this could be considered a positive feature. On the other hand, this mode of communication also encourages private discussions that may not be easily monitored by an adult, which then may be considered a negative feature. In the case of a large listening radius in a public chat room, the native languages of the users become an important consideration when deciding how this feature is manifested, as users may find it difficult and frustrating to not understand the content of conversation that often moves very quickly. This situation occurred during the ClubZora project and will be discussed in more detail in Chapter 7.

In addition, some users may find it amusing to “spam” the chat system—they rapidly enter nonsense letters in order to make it almost impossible for others to chat, as illustrated in Table 7. Please note that for all chat logs presented in this dissertation, participant usernames have been changed and the text of the chat is presented as written by the participant (i.e., the chat has not be edited).

Table 7

Example from ClubZora of a Youth Participant Spamming the Chat System (November 30, 2007).

Participant	Time	Chat
darryl	06:03:28	yfyuu ufkfmfpicah
darryl	06:03:30	Gry
darryl	06:03:31	Fe
darryl	06:03:32	Ft
darryl	06:03:33	Ftg
darryl	06:03:34	T
darryl	06:03:35	T
darryl	06:03:36	t
darryl	06:03:37	t
darryl	06:03:38	t
darryl	06:03:39	t
darryl	06:03:40	t
darryl	06:03:41	t
darryl	06:03:42	t
darryl	06:03:43	t
darryl	06:03:44	t
darryl	06:03:46	t
darryl	06:03:48	t
darryl	06:03:49	t
darryl	06:03:50	t
darryl	06:03:51	t
darryl	06:03:52	t
darryl	06:03:53	t

One method for dealing with this type of behavior is to have an adult mentor interject and attempt to address the situation. In the case of persistent behavior, a project administrator could “block” the user for a specified amount of time (i.e., a “time out”). Regardless of the method used to address and discourage the behavior, designers of the program should create clear expectations for users about this issue as well as the series of steps a mentor should use in order to remedy the situation (therefore this relates to *policies* and *mentorship*).

Another component of a virtual world program related to public communication is whether or not users are together “in real life” but communicating virtually. For example, in the ClubZora project, often times several youth from one Clubhouse would log into the program at the same time. For various reasons the conversation between these youth would often morph into “squabbling”—they would fight, tease, or argue with each other using the Zora chat system, even though they were sitting next to each other (and often from the conversation it was clear they were also talking with each other in real life as well). This became frustrating for other ClubZora users, as they could not “get a word in edgewise.” This was also frustrating for adult mentors and project administrators, as it was almost impssible to stop the behavior, especially if the users were “on a roll.” Often times if this situation escalated to the point in which it was very disrupting to the experience of others and/or if the language or content degenerated into inappropriateness, a project administrator would have to block users for a short period of time (per the *policies* of the program). Again, this is a situation of which program designers should be aware and thus prepare plans for addressing this type of behavior.

Designers of a virtual world program should use caution if they decide to allow users to engage in private communication, either by permitting a small listening radius, and thus encouraging private gatherings, or by letting private messages be sent between users. As public conversations within the world are considered public, adult mentors and project administrators can easily monitor the content of the conversations, whether in real-time (i.e., as the chat is occurring) or after the fact (i.e., by examining the chat logs). If the chat conversations are recorded to a log file during the program, users should be made aware of this at the start of the program. Private conversations, however, are not so easily monitored for privacy reasons (for example, the Active Worlds platform, upon which the Zora software was built, did not allow logging of private conversations due to privacy considerations). Privacy issues surrounding the monitoring and recording of private communication become very important considerations, especially if the world is targeted at preadolescents who are trying to seek autonomy.

Communication can also include the creation of a set of other users with whom one may want to communicate (i.e., a “Friends List”). Users need to be able to see when their friends are online and available to chat and interact within the virtual world. For example, in the ClubZora project, users were able to see the status and usernames of all enrollees in the project. However, this list was sorted alphabetically, and as there was a extremely large number of enrollees (over 550), it was impossible to see who was online. Therefore, in projects after ClubZora, the Zora software was updated so that the usernames of participants who were online would “bubble up” to the top of the list so that it was easy to see who was available. Creation of a list of contacts is especially important for older children and teens, as socialization becomes an increasingly important aspect of real life as well. Very large programs may have to allow users to create lists showing subsets of program users with whom a user would want to communicate. However, for smaller programs, designers may consider allowing each user to see the online availability of all other users, in order to encourage group coherence and cooperation.

Communication between the user and the project administrators. Virtual world program designers should also reflect on the ways in which the project administration will communicate with users, for example to announce events, to alert individual users to policy breaches, and to answer questions. This type of communication can have several modes:

- *Email.* This form of communication could be email from a project administrator to a group, a project administrator to individual user, or vice versa. While it may not be able to be stopped, user-to-user email outside of the program about the program should be discouraged, as it does not allow for monitoring of program safety by project administrators nor does it allow for gathering of important data for evaluation. Emails may be used to announce events or special activities within the world, to provide enrollment and access information (i.e., username and password), or to answer questions. For example, during the ClubZora project, I would receive emails from both youth participants and Clubhouse coordinators about topics ranging from importing custom 3-D objects to troubleshooting technical problems to avatar creation (see Appendix D).

- *Face-to-face communication*. This type of communication would occur in the face-to-face setting of the program.
- *In-world messaging objects.* Often virtual world software includes some sort of “messaging object,” such as a bulletin board. These objects allow users to leave messages for the owner of the object asynchronously (therefore, this is also a potential mode of user-to-user communication). For example, in the ClubZora project, there was a sign for the Code of Conduct. By clicking on the object, they were brought to a webpage with the Code of Conduct, where they could leave messages on the sign indicating any changes they would like to see made to the Code of Conduct; these messages could be viewed by all project participants.
- *In-world messaging.* Finally, virtual world software often includes the ability to message other users from within the world. This is often considered “private” chat and difficult to monitor, as described above. In-world messaging may be useful, though, for communication between mentors, or mentors and project administrators. For example, in the ClubZora project, all mentors had the ability to send messages to

each other from within the software—this feature was useful, and often necessary, for instance if the mentors were dealing with a situation with which they needed help, but could not relay the details of the situation over the group chat system.

Communication is a major component of a virtual world program experience, and one that has potential to "make or break" the program. Therefore, designers should give considerable thought to how communication between users and users and administrators occurs. In addition, designers should create a set of guidelines (*policies*) for users regarding expectations for communication—about language use, appropriateness of content, etc.—and a set of guidelines for mentors for dealing with communication difficulties.

Designing for the Attribute of Participation

Designing a virtual world program for the attribute of participation requires consideration of the question: "How can we get youth to participate in our project?" There are several ways in which designers can encourage, support, and facilitate participation in their virtual world program; noting, though, that participation can be reflected in some of the other attributes, such as communication and artifacts. For example, participation in the program may be reflected in the amount of communication users engage in or the number of artifacts that they create. The first strategy is to have "champions" of the project—people who are excited and enthusiastic about the program and who will "shout from the rooftops" about it both to potential new participants and current participants. These champions can be adults (for example, the doctors, nurses, and child life specialists in VCLC project, the Clubhouse Coordinators and other Clubhouse staff in the ClubZora project), and other youth. This is the premise of Proposition 4 of Critical Mass Theory mentioned in the previous chapter: “Having high-interest and high-resource individuals among the early users of an interactive medium is highly favorable to achievement of universal access.” (Markus, 1987, p. 504). If youth who are popular and whose actions and suggestions influence other youth tell their friends about the program or use the program frequently, new youth may join the program.

Participation is one of the attributes that requires the most monitoring on a regular basis. Monitoring of participation is especially important at the start of the project when there is potentially a lot of “buzz” about the project. If this window is missed, it may be difficult to recruit participants at a later time. In addition, “dips” in participation need to be noticed and addressed quickly so that participation in the program does not dwindle. Both of these sentiments are reflected in Proposition 1 of Critical Mass Theory (Markus, 1987): “Either usage will spread to all members of the community (universal access will be achieved) or no one will use the medium (for communications internal to the community), *either because no one started using it or because usage fell off in the absence of reciprocity* [emphasis added]” (p. 500). In instances of low participation, communities need to be energized by project administrators, through techniques such as new activities, increased communication by project administration, or increased activity within the world by “high value” youth or project administration so that youth are inspired to participate.

Program designers also need to capture youth's interest both initially (i.e., upon first entrance to the world and first experience with the program) and continuously (i.e., as the program is underway) so that the youth want to stay in the world/program and so that they want to come back to the world/program. This can be done in a few ways—one way would be to front-load the program or world with "awesome things" that are highly valued by the youth. Designers can determine what these "awesome things" are by talking with youth of their target demographic prior to the start of the project. Another way would be to have some sort of "rewards" system for acknowledging participation in the world/program. This does not have to be a competitive system (i.e., one in which youth earn and compare points with others), but instead could be a recognition system. For example, as a particular youth becomes skilled in the program, he/she could be given a "badge of honor" or a specific role within the program (e.g., recognition for a youth who was a great builder, another who was great at greeting new participants and teaching them about the program).

Another way to have initial and long-term participation is to ensure, as much as possible, that when youth log into the program there is someone else "out there;" for most, but not all, youth want to be online with others, whether youth or adult mentors. This is particularly important for an "open" world (i.e., one which is always available), and therefore program designers should plan to have mentors take shifts at beginning of the program in which they are logged into the program and available to welcome and work with youth participants. This strategy would prevent youth from feeling alone but also gives mentors an opportunity to explain the purpose of the program, help troubleshoot problems that arise, and teach participants about the program. The key is to create a situation so that when the program starts youth are excited and tell their friends. Designers should aim to create—and keep—positive “buzz” about the project, both initially and throughout the program.

Finally, program designers need to carefully think about the question: “What does participation mean to your program?” Participation is internally defined by the program and is related to the attribute of purpose. For example, for some programs participation may mean that participants log-into program a certain number of times, that they spend a certain number of minutes online, and they attend face-to-face meetings or special events (e.g., VCLC has a fundraising walk). For other programs, participation may mean that users build a certain number of artifacts about certain topics, or that they engage with a certain number of program activities (e.g., if the purpose of the program is to teach science knowledge, the participants need to have completed three curriculum activities), or they contribute a certain amount of time to participating in chat (e.g., if the virtual world program is to be used as a means of therapy for ill youth, then there may be a goal of a certain number of minutes of group therapy).

Designing for the Attribute of Play

The ability for youth to play in a virtual world is an important support for their development. However, much as the term *play* is somewhat ambiguous, so are the ways in which virtual worlds can be designed to provide opportunities for play. Program designers can either natively include games or allow users to makeup games on their own by providing the necessary tools. I believe that a combination is ideal, as the pre-created games can serve as an ice-breaker for youth to be introduced to and gain experience with the world. Furthermore, games can serve as an initial means for youth to want to join and return to the program, in that the games can provide an easily-understood initial purpose to the world—to play games—while the tools for making games allow youth to use their imaginations.

Virtual worlds are ideally suited for role-playing games and therefore should support youth in their desire to engage in this type of play. In order to support role-playing games, however, the virtual world should allow users to modify the look of their avatar if possible and provide opportunities to build supporting structures necessarily to the game. For example, in the ClubZora project, several members created a compound called "Area 34" in which they assummed military-like roles.

The specifics of game design is an entire field within itself and thus beyond the scope of this chapter.[33] However, the key take-away here is that play must be supported in virtual world programs for youth, whether through traditional games that are pre-created, through games that the youth can develop themselves, or a combination of both. When possible, the program designers should talk with youth in the target population to ask what they would like to see in terms of games within the virtual world program; doing so means that not only

[33] A starting resource examining game design is: Schell, J. (2008). *The Art of Game Design: A book of lenses*. Burlington, MA: Elsevier Inc.

can the designer ensure that the tools are available to meet the desires of the youth but also will help ensure that the youth are interested in the program.

Designing for the Attribute of Artifacts

When designing a virtual world program for preadolescents, an integral component of the program should be the ability for the youth to create artifacts as a means for them to share personally meaningful objects with others. These artifacts can be created in the virtual world, in the real world and showcased in the virtual (e.g., digital art work), in the virtual world and produced in the real world (e.g., in the VCLC project, youth worked together to create a newsletter that showcased aspects of the virtual world, including screenshots, that was then printed and mailed to all participants and their families), or only in the real world (e.g., activity worksheets). In particular, there are four considerations for virtual world artifacts that designers should consider: (1) the size of available object library, (2) the ability to customize avatars, (3) the pre-population of world, and (4) object permissions.

First, designers should decide whether users will have access to a limited or unlimited set of object choices. A limited set of objects may frustrate some users who want lots of choices in order to differentiate their virtual spaces from those of others (i.e., a limited object set means that users could have similar-looking personal spaces). An unlimited set of objects, however, means that users may not have to be creative in how they develop their spaces, as the objects would already be available to them. For example, in ClubZora coffee tables were often used for staircases. Limited choices force users to “think outside the box” with the objects are available. If the object choices are limited, though, several objects should allow for customization with pictures, videos, and sounds so that users can still allow them to be personally meaningful. In addition, unlimited choices may cause more concerns about appropriateness of choices—for example, several objects in the main ActiveWorlds library are alcohol-related, which would be inappropriate for a virtual world program for preadolescents. It is also possible to use additions to the original set of possible objects as “rewards” for certain behaviors—for example, in the VCLC project, users could request that objects be added when they had successfully completed an activity.

Second, the user should be able to customize his/her avatar. In the ClubZora project, users were able to select from a set of avatar choices, but they were unable to customize their avatar due to limitations of our instance of the Active Worlds platform. Though this was not an available feature in the Zora software, it is an important one for virtual world programs to consider, especially since many of today’s most popular virtual worlds (i.e., Neopets and Habbo) allow this ability and thus users are often expecting it. Most importantly, the ability for users choose how they represent themselves within the world is an important feature to support their development, as it relates to how preadolescents socialize with peers.

Third, designers should give careful thought to how much of the world is pre-populated (i.e., what structures are already present in the world prior to the start of the project). This consideration depends on the particular project—some types of programs may be better suited to a minimally pre-populated world while other types of projects may be better suited to a moderately or highly pre-populated world. For example, the VCLC project was successful with little pre-population. ClubZora however, as described in detail in Chapter 7, was not successful with minimal pre-population.

Fourth, designers should consider how object permissions work within the world; meaning, what are the software rules governing where objects can be placed and who can move or edit the objects? For example, all of the Zora projects allowed objects to be created anywhere by anyone, though only the owner of the object or the project administrator could move the object. The converse of this rule would mean that objects could only be placed on other objects by the owner of the underlying object. This choice of object permissions was done explicitly in ClubZora so that users could engage in collaborative building, i.e., more than one user could build in a space. Unfortunately, in a project as large as ClubZora, this decision had many drawbacks, as will be reflected upon in Chapter 7.

Designing for the Attribute of Policies

The application of the attribute of policies to the design of a virtual world program influences, and is influenced by, the other attributes presented. For example, the various ways in which youth are allowed to communicate within the program dictate the policies that must be in place for the content of the communication and how that communication will be monitored. As another example, if youth are allowed to customize objects using images that they provide, then a policy should be created regarding what content is acceptable and what is not.

There are several considerations regarding policies that designers of virtual worlds should consider (see Meyers, Nathan, & Unsworth, 2010). First, as many virtual world programs will be used within the context of another organization, designers should become familiar with the host organization's rules and policies, to ensure that the policies of the program do not contradict those of the host organization and that when possible, the host organization's policies are incorporated into the program's policies.

Second, designers need to determine who is allowed to access the program—both the face-to-face component of the program and the virtual world software. The determination of the intended audience is tied to the purpose of the program. For example, the ClubZora project was limited to members of the Computer Clubhouse Network. The project team designed several safeguards to prevent access by others. First, the software was only available to Clubhouse Coordinators, and therefore (hopefully) only installed at the Clubhouses. Second, enrollment into the program was requested via an online form from *The Village*; this online form required a Village email address and sent hidden fields to the program administration in order to ensure that the enrollment requests were in fact from Clubhouse members.[34]

Third, when creating the specific policies of the program, designers should reflect upon whether any of the common Internet safety guidelines for children, tailored to their program, should be included in the program's policies. For

[34] The research team received 20 enrollment requests from outside of *The Village*.

example, a designer may want to review a publication by the National Center for Missing and Exploited Children, entitled *Keeping Kids Safer on the Internet* (2009) to get more information regarding ways in which their programs policies should include rules and guidelines to keep youth participants safe while online. As another example, a designer may want to review the statutes of the Children's Online Privacy Protection Act (COPPA)[35] or read the Federal Trade Commission's report to Congress entitled *Virtual Worlds and Kids: Mapping the Risks* (2009, December).

Fourth, whenever possible, designers should provide opportunities for youth to participate in the generation of the rules for the virtual world program. Reflecting on Second Life, Robbins (2007, August 24 - 26) wrote:

> No matter what form of communication takes, it can be guaranteed that users will take advantage of the paths made available by the software to create social norms and rules to govern the communication. This space between the communicative paths, between the rules of the system and the rules made by users, is made possible by the system's mechanics and the rules slowly developed through user culture is a space seldom explored. (p. 27)

Some examples of how this could occur include through a message board in which users can post suggestions, through arranged meetings in the world in which users could gather at a specific location, such as a Town Hall, to discuss world issues, or through direct communication with program administration (e.g.,

[35] See http://www.ftc.gov/privacy/privacyinitiatives/childrens.html for more information.

if a youth wants to request a rule change based on an experience he/she has experienced in the world, he/she could email a program administrator directly).

Fifth, designers should consider how youth will be aware of the policies of the world; the policies should be in an easily-accessible and easily-noted place. For example, in the ClubZora project, a participant's request for enrollment would only be processed if they had selected that they read, understood, and accepted the ClubZora Code of Conduct. This is not an uncommon practice for websites—many, if not all, require a potential user to accept their *Terms and Conditions* before the user is granted access to the site. Despite this initial display of the Code of Conduct/Terms and Conditions/Rules, a user should be able to easily return to them at any point in the program. When working with youth, it is particularly important that they be written at such a level as they could be *easily* understood by the youth. Designers may even want to consider having a variety of youth from the target age read and provide feedback on the Code of Conduct/Terms and Conditions/Rules in order to ensure that they are clear to participants.

Next, designers need to consider not just *what* the policies are, but *how* they are going to be *monitored and enforced* within the program. This is not unlike the real-life challenges with which lawmakers and law enforcement must contend. As a specific example, Neopets has *Neo Rules* for chat[36], *Golden Rules to Internet Safety*,[37] and *Terms and Conditions*, each written in youth-friendly language. In addition, in the "FAQs" for parents, they answer the following two questions about safety, which in turn relate to Neopets policy monitoring:

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[36] The *Neo Rules* can be found at: http://www.neopets.com/chatrules.phtml
[37] The Golden Rules of Internet Safety can be found at: http://www.neopets.com/help/goldenrules.phtml

> *Is Neopets safe for my child?*
>
> Yes! Neopets is monitored 24/7 by a team of highly trained, dedicated individuals. We also have many tools and filters in place to make sure that Neopia is a safe, friendly environment. Please review basic internet safety with your child before using any website, and make sure you never give your password or log in information to anyone! (Neopets, 2010, June 26b)
>
> *Is Neopets monitored 24/7?*
>
> Yes, both Neopets and Petpet Park are monitored around the clock by an excellent team of skilled monitors, even on weekends and holidays! (Neopets, 2010, June 26a)

The administrators of Neopets, then, indicate that they constantly monitor and have tools and filters built into the software in order to enforce their policies.

Prior to the start of the program, designers should create protocols for enforcing the program policies and for responding to policy breaches. For example, if the world is open to youth at all times, how is the chat going to be monitored? One way to monitor the chat for content would be to assign adult members of the program staff to a specific schedule in which they must be online during that time to monitor. Another way, if it is not possible to have constant monitoring, is to make it a policy that the chat logs from the previous day are read every morning by a member of the program staff. Program designers may also have an automatic filter in place in the software that “catches” certain key words/phrases or they may even just shut down certain features of the program, such as the chat, when adult monitoring is not possible. Designers may even want to consider allowing youth participants, who show extreme interest in the program and who have been shown to be responsible citizens of the world, to be monitors; they would communicate with the program staff any policy breaches and have a series of steps available to them to respond.

Once a program determines *what* its policies are and *how* the policies will be enforced, the program must also consider *how* they are going to *respond* to situations in which the policies of the program are violated. Programs should consider having a series of steps, in increasing severity, which they can use for these situations. For example, the first step in dealing with a policy infringement might be a warning to the user. A second step, if the first is not sufficient, may be an email to the participant, carbon-copying the participant’s host organization authority (e.g., if the program is being run within a school, program administration may choose to speak with the classroom teacher). For example, in the ClubZora project, the few times in which the program administrator had to go to “Step 2” of the policy protocol, she emailed the participant, carbon-copying the participant’s Clubhouse Coordinator so that he/she was aware of the situation. This email also contained information regarding what the next steps would be if the misbehavior continued, so that all parties were aware. A next step could be to eject or block the user from the virtual world, either for a short “cooling-off” period or as a final step, permanently. A summary of these steps should be available for youth to view, so that the youth can clearly understand what is expected and how misbehavior will be addressed within the program.

Regardless of the specifics of the actions to be taken by program administration to deal with policy infractions, program designers should create a protocol prior to the start of the program, which should be updated as needed as the program continues, so that all program staff and the youth participants are clearly aware of the policies, how the policies are enforced and monitored, and how violations of the policies will be addressed.

Designing for the Attribute of Mentorship

The design for the attribute of mentorship occurs mostly at the program level, rather than at the software level. Designers of virtual world programs need to determine in what capacity adults will engage in the program. Mentorship in the virtual world can range from simple (e.g., an adult only interacts with the youth to provide guidance in using the world) to complex (e.g., the adult serves as a “true” mentor around some important topic, such as medical adherence).

Regardless of the types of mentorships available in the world, it is important that program designers allot enough resources, both in terms of time and money, into their mentors. For example, if the world is open (i.e., available at all times for youth), then in the ideal case, an adult mentor would be available online at all times. However, that may be an impossible goal due to the incredible amount of time required (and, if being a mentor in the program is tied to compensation, could require an incredible amount of money). In this case, options include a mentor reviewing the chat logs and activity history on a daily basis to monitor for appropriateness, or perhaps an alert can be built into the software so that when a youth logs into the software, an adult mentor receives an email or text-message (this was implemented in Zora projects after ClubZora) so that the adult mentor in turn can log into the software.

Even if the world is not open—for example, the world is part of a program that is used twice a week in a classroom during the fall to teach historical concepts—it is still important that designers consider the adult support that would be necessary for the program to be successful. Continuing this example, adult support would be necessary to aid and support the technology in the classroom (e.g., installing the software), to answer technical questions, and to guide students though the program, as it cannot be expected that the classroom teacher could assume these additional responsibilities. I must stress the need for programs to ensure that there are adult mentors who are available throughout the duration of the program, particularly at the beginning of the program, to teach, support, and welcome youth participants. This is a resource-heavy endeavor, however, and one that program designers should consider carefully.

If there is the potential for youth of different languages to participate in the program, then mentors who can communicate with those youth are necessary. If the program is unable to have adult mentors who can interact with youth in all supported languages, then the designers should consider not allowing those youth to participate, as the designers must be able to monitor safety and support the youth in using the program.

If a more complex mentoring relationship is desired, programs should examine publicly-available resources, such as those provided by the non-profit organization MENTOR.[38] For example, their publication *Elements of Effective Practice for Mentoring* (2009) provides detailed information about program design and planning, management, and operations of mentoring programs. Program designers should be particularly thoughtful of the role of adult mentors in virtual world programs that deal with sensitive issues, such as medical issues in the VCLC project, as those mentors require additional knowledge and support prior to the start of the program. For example, in a virtual world program designed for youth with diabetes, the adult mentors need to be well-versed in the medical information pertinent to this population, both so that they can contribute to the program and so that they can monitor the safety of the participants (i.e., so that they can correct or clarify any misinformation, answer questions, and perhaps more importantly, recognize “danger” situations that require the immediate intervention of trained medical staff, such as if a youth threatens himself or others). In summary, I see several key areas in which adult involvement is necessary:

- Designing the program
- Administering the program
- Recruiting youth participants

[38] More information about this organization can be found on their website: http://www.mentoring.org/.

- Processing enrollment into the program, including providing usernames and passwords and getting permission from parents (when necessary)
- Providing face-to-face support in situations where program is implemented in a particular location (i.e., classroom or after-school setting)
- Monitoring chat and other objects for appropriateness
- Spending time online with youth (content knowledge required will vary depending on the program's purpose)
- Answering technical questions/help debug—this may be within the world itself, face-to-face, via email, or via phone.

In the next chapter, the framework of attributes is applied to the evaluation of virtual world programs.

Chapter 6: The Application of the Attribute Framework to the Evaluation of Virtual World Programs for Preadolescents

Virtual world programs present several challenges to evaluations of virtual world programs. These include:

- Most virtual world programs will be implemented in nonformal educational settings, which in themselves bring challenges.
- Virtual world programs have two potential contexts for observation and data collection: the face-to-face context (i.e., the classroom, after-school setting, household, hospital room, etc.) and the virtual context. Evaluation and data collection in this latter context can be done with both standard methods and new methods designed specifically for virtual worlds.
- Because of the nature of virtual world programs, naturalistic observations in both the face-to-face context and the virtual context will be a key data source, in addition to other types of new data forms, such as chat logs, artifact logs, and user access logs.
- Virtual world programs are a fairly new idea, and currently they often reside in university settings, where it is likely that program designers and administrators have previous experience in various research methods. However, I believe that virtual world programs can, and should, be used by organizations in non-university settings, and therefore the evaluation methods should be accessible and understandable by nonacademic personnel. These organizations may

be required to undertake evaluation activities in order to receive grant money, and therefore would need guidance with regards to the evaluation of virtual world programs.

- Following this, virtual world programs may not have the monetary capacity to neither have a dedicated evaluator on staff nor to hire an external evaluator. Therefore, the program staff need to be able to undertake the evaluation plan on their own. However, I would suggest that programs consider hiring an evaluation consultant in order to help guide the initial development of the evaluation plan.

With these challenges and considerations in mind, in this section, I will provide an approach for the evaluation of virtual world programs that uses the attribute framework described in the previous chapters. In order to make this approach accessible to a variety of audiences, I will attempt to articulate this approach with the non-university user in mind. However, there are more advanced methods within the approach that a user with an understanding of research and statistic methods may want to consider, and therefore the suggestions that follow should only be seen as a starting-point.

The core of my suggested approach is based on two established program evaluation approaches—case study research and self-evaluation. What does *case study* mean? Swanborn (2010) provides seven characteristics that define most case studies; in focusing only on the key characteristics that relate to virtual world programs, case studies for the purposes of this dissertation study can be thought of as:

The study of a social phenomenon:

- in the case's natural context
- where the researcher, guided by an initially broad research question, explores the data and only after some time formulates more precise research questions, keeping an open eye to unexpected aspects of the process by abstaining from pre-arranged procedures and operationalisations
- using several data sources, the main ones being (in this order) available documents, interviews with informants and (participatory) observation. (p. 13)

I would like to note that there are also case studies for teaching (e.g., as is common in business schools); however, these types of case studies have a different purpose and therefore have their own guidelines.

Why do I use the term *approach* when describing evaluation of virtual worlds? Hamel (1993), when describing case studies, states: "Case studies employ various methods. These can include interviews, participant observation, and field studies. . . It would thus be more appropriate to define the case study as an approach" (p. 1). I believe this sentiment also applies to evaluation of virtual worlds—because of the challenges listed above, evaluation of virtual worlds will require a variety of methods, and therefore the term *approach* is apt.

The purpose of a case study is to create a detailed description of the program by utilizing a variety data sources. Some key data sources that can inform case studies of virtual world programs include:

- Participant observation, in which the research also acts as a participant in the program
- On-site observations, both in the face-to-face and virtual context
- Open-ended interviews
- Collection of documents

Therefore, for the evaluation of virtual world programs, the aim of using a case study approach is to generate a detailed description of the program, created using a variety of sources of data and evidence, and analyzed using a variety of methods.

When considering evaluation of a virtual world program, it is important to think about the "end result"—what needs to be produced at the end of the evaluation and why. For example, if the aim of a virtual world program is to increase students' vocabulary, a grant funder may require that the program document changes in vocabulary throughout the duration of the project. Therefore, at a minimum, the evaluation approach needs to include methods by which these specific data can be gathered, analyzed, and reported (e.g., perhaps a standard vocabulary questionnaire is completed by participants before, during, and after the program). While certainly a program can collect more data—perhaps pertaining to information that is especially important to the program but not necessarily to an outside source—there may be certain data collection and reporting requirements that have to be addressed.

Regardless of the type of approach used, most evaluations serve one of two major purposes; they can be summative (i.e., focused on the *outcomes* of the program) or formative (i.e., focused on the *process* of the program) (Jacobs & Kapuscik, 2000). However, before determining which purpose the evaluation serves, the level of evaluation activity must be determined. The W.K. Kellogg Foundation has written an *Evaluation Handbook* (1998) for project directors of its funded projects, “guided by the belief that evaluation should be supportive and responsive to projects, rather than become an end in itself. . . . [Evaluation should be thought of] as a relevant and useful program tool” (p. III). This handbook describes three levels of evaluation: project-level, cluster, and program and policy. The evaluation of virtual world programs most closely matches the intentions of the project-level evaluation information.

To return to the potential purposes of evaluation, the W.K. Kellogg Foundation describes three main types: context evaluation, implementation evaluation, and outcome evaluation. Context evaluation examines the larger context in which the program resides (i.e., the community context, political context, organizational context, etc.). With a slightly adjusted perspective, this level of evaluation may also be called a needs assessment. Jacobs and Kapuscik (2000) described five purposes of this type of evaluation:

(1) To document the size and nature of a public problem

(2) To determine unmeet need for services in a community

(3) To propose program and policy options to meet needs

(4) To set a data baseline from which later progress can be measured

(5) To broaden the base of support for a proposed program. (p. 148)

When designing a program, it is extremely important to understand the population for whom the program is intended. Many of the issues that should be considered during the design phase of a virtual world program, prior to the start of the program, were discussed in the previous chapter. Therefore, I will not focus on this type of evaluation in this work; however, this is an area of future work, perhaps to formalize the design process from a needs-assessment evaluation perspective. As such, I will be concentrating on the two other focuses of evaluation activities: implementation and outcomes.

Implementation Evaluation

According to the *W.K. Kellogg Foundation Evaluation Handbook* (W.K. Kellogg Foundation Evaluation Unit, 1998), key objectives of an implementation evaluation are to:

- Improve the effectiveness of current activities by helping initiate or modify initial activities
- Provide support for maintaining the project over the long term
- Provide insight into why certain goals are or are not being accomplished
- Help project leaders make decisions
- Provide documentation for funders about the progress of a project, and can be used for developing solutions to encountered problems. (p. 27)

Implementation evaluation provides a foundation for an outcome evaluation: "Knowing *why* [emphasis original] a project achieves its goals is more important than just knowing that it does" (W.K. Kellogg Foundation Evaluation Unit, 1998, p. 27).

An implementation evaluation can be undertaken during or after the program is completed. If the evaluation is to be completed at the end of the program, data should still be collected throughout the duration. While extensive analysis of the data may not be possible on a regular basis, program administrators should examine the data that is collected frequently throughout the duration so that if any "red flags" appear they can be dealt with as needed, in the form of mid-course program corrections (Jacobs & Kapuscik, 2000). For example, as will be described in more detail in the next chapter, the ClubZora project administrator had monitored the communications between herself and participants. Two months into the project, a "red flag" indicated that there was an issue with the communication mechanism; this issue was corrected so that it would not impact the remainder of the program.

Goals of this type of evaluation of a virtual world program are to understand how the program is being (or was) implemented, with the ultimate end goal of improving the program implementation both "on the spot" (in the case of red flags) and for future instances of the program. Therefore, there are three overarching questions for this type of evaluation:

(1) How is (was) the program being used by participants?

(2) How can the program be improved?

(3) How does (did) implementation of the program compare to initial expectations?

Each of these overarching questions relates to specific questions for each of the seven attributes in the framework that can be asked during an implementation evaluation; these specific questions will be provided in Tables 8 through 13. The choice of verb tense depends on when the evaluation is completed (during or after); for the purposes of this section, I will use the present tense when providing examples of potential evaluation questions as I believe that program administrators should be monitoring the data throughout the program in order to be aware of “red flags.”

Once the evaluation questions are determined, the next question is, “What data or evidence are needed to address the evaluation questions?” Two main types of data will be used to address evaluation questions of virtual world programs: qualitative and quantitative. Qualitative data are “are found in transcripts of interviews, responses to questionnaires, and accounts of individuals’ personal observations” (Jacobs & Kapuscik, 2000, p. 103). Quantitative data “are in the form of numbers (i.e., counts, measurements, and proportions) and can be tabulated and analyzed using a range of statistical techniques” (Jacobs & Kapuscik, 2000, p. 103). Yin (1994; 2008) describes six main sources of evidence that often used in a case study approach; these sources are qualitative and quantitative in nature:

(1) *Documentation* (such as letters, administrative documents, written reports of events, and meeting minutes)

(2) *Archival Records* (such as service records, organizational records, maps and charts, lists, survey data, and personal records)

(3) *Interviews* (open-ended and focused)

(4) *Direct observations* (can be causal or formal; often includes photographs)

(5) *Participant-observation* (observations that occur when the observer is also a participant in the study)

(6) *Physical artifacts* (physical evidence)

For the purposes of the evaluation of virtual world programs, these sources need to be updated to reflect the unique nature, and data collection potential, of the virtual world software. Therefore, I propose the following additions:

(1) *Documentation*: should also include emails, messages left on message boards, and mentor field notes.

(2) *Archival Records*: should also include chat logs, prop dumps (data files that indicate the coordinates of objects within the world, to be used to create a map), tracking data (i.e., logins, logouts, movement within the world, artifact creation, etc.), and online questionnaires.

(3) *Interviews*: should also include in-world interviews and “focus groups” (group meetings).

(4) *Direct observations*: should also include field notes from both the face-to-face program and when in the world, screenshots[39] and screen video capture[40] taken during world walk-throughs.

[39] Most, if not all, computers have the native ability to take images of the screen, though there is also software that allows for more advanced screen capture.

[40] There are several options for video screen-capturing software; the one I used in this study is called CamStudio (http://camstudio.org/) and is available for free.

(5) *Participant-observation*: should also include field notes with relevant references to the chat logs, screenshots, and questionnaires. Both the project administrators and youth should have opportunities to participate in this type of observation.

(6) *Physical artifacts*: should include screenshots and videos (both those created simply as a walk-through of the world and those created to showcase projects within the world).

As virtual worlds technology develops, there will more and more opportunities for new forms of evidence to be used to support a case study approach. One potential hazard is that there will be *too* much data collected (for example, the logs of the ClubZora project, which include the chat logs, would number over 50,000 pages if they were to be printed out). Therefore, it is important that the evaluation questions be clear at the start of the evaluation so that the data needed can be found. Table 8 summarizes my suggested evaluation strategy for virtual world programs.

Table 8

Summary of the Evaluation Strategy for Virtual World Programs.

Approach Level	Guiding Approach	Level	Focus	Purpose	Overarching Evaluation Questions	Types of Data/ Evidence Needed
Primary	Case Study	Project—a specific virtual world program	Implement-ation (process)	During the program: mid-course corrections After the program: improve-ments for future implementations of the program	(1) How is the program being used by participants? (2) How can the program be improved? (3) How does implementation of the program compare to initial expectations?	Qualitative and quantitative
Secondary	Self-evaluation		Outcomes	Determine whether a program met its intended outcomes	Has the program achieved its intended outcomes?	

Once the data is collected, it needs to be analyzed. Swanborn (2010) describes five traditions for analyzing data collected during a case study:

1. Analysis of data collected in the field of changing organizations, according to Yin.[41]
2. Analysis of data collected in one of the qualitative traditions, especially in the grounded theory approach of Strauss and Corbin.[42]
3. Data analysis and presentation according to the work of Miles and Huberman.[43]
4. Time-series analysis.
5. Data analysis according to Ragin's method, using Boolean logic and fuzzy-set theory. (p. 115; footnotes added)

Of these five, the first three are the most common for case studies in the social sciences; the latter two are often utilized in technical fields and political sciences. Detailed discussion of these analysis techniques is beyond the scope of this chapter; for more information about these techniques, the corresponding reference is provided in the footnote.

However, as an example of an analysis approach, Yin (1994; 2008) illustrates several ways in which case study data can be analyzed:

(1) *Pattern-matching*: comparing predicted results with those reflected in the collected data.

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[41] See Yin (1994; 2008).
[42] See Corbin and Strauss (2008).
[43] See Miles and Huberman (1994).

(2) *Explanation-building*: developing a set of causal links in order to develop and explanation about a case.

(3) *Time-series analysis*: examination of data points over time; can be simple or complex.

(4) *Program logic models*: examination of complex chain of events over time (see also W.K. Kellogg Foundation Evaluation Unit, 2004).

Jacobs and Kapuscik (2000) also describe more generally ways in which evaluation data can be analyzed. Quantitative data are often analyzed with statistical procedures, such as measures of central tendency (mean, median, and mode), measures of variation (standard deviation), comparison between groups, significance tests, and measures of association between variables. Qualitative data are often analyzed through triangulation (using multiple measurements in order to understand the same issue) and data displays (such as tables, charts, and graphs). Again, detailed mechanisms and the specific techniques for analyzing the data collected will not be discussed in this work.

Recently, new techniques have been developed in order to analyze the data that are gathered in virtual worlds. For example, Rosen, Woelfel, Krikorian, and Barnett (2003) developed “methods [that] allow for the analysis of online chat, including parsing the data into separate and interrelated files to determine individual, group and organizational patterns,” (para. 1) which allow for both qualitative and quantitative analysis. More recently, Rosen (Rosen, 2009) developed software that permits social network analysis based on chat logs from virtual worlds. This software produces graphical and tabular networks that indicate how participants in the world are connected to each other and also highlights the primary “connectors”, which allows for administrators to understand whether the world was user-driven or administration-driven (i.e., if the main connectors are participants, it is an indicator that the world is participant-driven). Dukas (2008, October) describes data mining techniques in virtual worlds, using data from the River City virtual world program, and the development of the *Avatar Log Visualizer*. More recently, Dukas (2009) described ways to analyze navigational paths in virtual worlds.

As an additional example, for the ClubZora project, I used a custom log parser, developed by the DevTech Research Group, to access our data; I was then able to import the into traditional analysis software (in this case, SPSS). I also used a program called Mapview that used the prop dump files (data files that contain the coordinates and descriptions of artifacts in the world) in order to create birds-eye-view maps of the world; by using prop dumps that were created every week of the project, I had a visual means of examining the growth of the world. Of course, this is not to say that traditional analysis techniques are not important; rather, the data collected in virtual world software are opening up opportunities for new forms of analysis, based on traditional techniques. The types of analysis undertaken during an evaluation of a virtual world program will depend on the data collected, and the knowledge and abilities of those completing the evaluation.

In the following tables, of which there is one for each of the seven attributes, I provide example implementation evaluation questions, the context for the question (face-to-face or virtual), the data/evidence that would be needed, and possible analysis methods. Note that the questions are provided only as examples—some questions will not be important to all programs and there also may be other questions that are more pertinent. For each of the questions, the subsequent implicit question should be: “How can the program be modified to address these results?”

Table 9

Possible Implementation Evaluation Questions for the Attribute of Purpose in a Virtual World Program.

Attribute 1: Purpose

Possible Evaluation Questions	**Context**	**Data/Evidence Needed**	**Possible Analysis Methods**
Do participants understand why they are part of the program? What do they believe the purpose(s) of the program is (are)? How does this match the program's planned purpose(s)?	Face-to-face & Virtual	Face-to-face and virtual interviews with participants; Periodic questionnaires; Program planning documents	Content analysis; Comparison of results to program planning documents
Is the face-to-face component of the program only being used by the intended participants? Is the virtual component of the program only being used by intended participants? If no, how are these youth accessing the program?[a] How may the mechanisms preventing "authorized" access need updating?	Face-to-face & Virtual	Face-to-face interviews with participants and pertinent organizational personnel (i.e., teachers, after-school facilitators) (difficult to determine virtually)	Content analysis; Comparison of results to program planning documents

Attribute 1: Purpose

Possible Evaluation Questions	Context	Data/Evidence Needed	Possible Analysis Methods
Are participants using the program in a manner that corresponds to their developmental stage? If no, in what ways do youth think the program could be changed to better suited their needs?[b]	Face-to-face & Virtual	Interviews with participants and other key informants; Field notes from observations during the program and in the world[d]	Review of field notes for important observations
How are participants engaging with the content of the program? How does this match expectations?[c]	Face-to-face & Virtual	Interviews with participants and other key informants; Field notes from observations during the program and in the world[d]; Program planning documents	Analysis of field notes; Comparison of key
Are participants demonstrating changes in content knowledge? If so, how?	Face-to-face & Virtual	Content-specific questionnaires given at pre-determined intervals	Analysis of participants' answers to the questionnaires over time

Attribute 1: Purpose

Possible Evaluation Questions	**Context**	**Data/Evidence Needed**	**Possible Analysis Methods**
If creation of a community is a purpose of the program: How are participants developing a community?	Face-to-face & Virtual	Interviews with participants and other key informants; Field notes from observations during the program and in the world[d;] Chat logs (see communication attribute)	Social network analysis (Rosen, 2009; Rosen et al., 2003)

[a]*Examples: If a home-based program, are siblings using the software Are youth sharing their usernames and passwords with friends? If an organization-based program, are youth forgetting to logout of the software, allowing others to access their accout?*
[b]*Examples: Does the program allow them enough opportunity to interact with friends? What do they think of the communication features?*
[c]*Examples: Are youth completing reading assignments? If no, why? Are they too hard? Too boring? Are youth completing the activities that were desgined to teach the program's content? If no, why? If yes, which activities do they enjoy and why?*
[d]*Examples:In the VCLC project, we were informed by hospital staff that one youth had visited another in the hospital several times. Also in this project youth participants and their families joined together for a fundraising walk.*

Table 10

Possible Implementation Evaluation Questions for the Attribute of Communication in a Virtual World Program.

Attribute 2: Communication

Possible Evaluation Questions	**Context**	**Data/Evidence Needed**	**Possible Analysis Methods**
What do participants talk about?	Face-to-face	Field notes, transcriptions of recorded conversations (with permission)	Qualitative content analysis; thematic analysis
	Virtual	Time-stamped chat logs; email; artifact messages	Qualitative content analysis; thematic analysis
How often do participants communicate with each other?	Face-to-face	Field notes	Participant observation
	Virtual	Time-stamped chat logs with corresponding participant demographic data	Analysis of the frequency of communication of participants

Attribute 2: Communication

Possible Evaluation Questions	**Context**	**Data/Evidence Needed**	**Possible Analysis Methods**
Who is engaging in communication activities? Are there differences in communication based on demographic variables (e.g., gender, age)?	Virtual	Demographics of participants (i.e., age, gender, location, etc.); chat log	Correlation of frequencies of communication to demographic information
Are participants receiving communications from administrators? Are participants acting on the communications (e.g., announcement of activity/event)?	Face-to-face & Virtual	Log of click-throughs and participant activities	Examination of click-through rates of tracking links in messages; analysis of frequency of engaging in action recommended in message; Interviews
Of the total number of members, how many are actively participating in communications? Are there groups of participants who are not participating in communications? If yes, why?	Face-to-face & Virtual	Frequencies of participant usage; total program enrollment numbers	Calculation of frequency ratios; Interviews

Attribute 2: Communication

Possible Evaluation Questions	Context	Data/Evidence Needed	Possible Analysis Methods
Are participants responding to messages from other participants or just messages from administrators (i.e., is this a participant-driven world or administrator-driven world)?	Face-to-face & Virtual	Response rates for requested actions	Analysis of response rates from participants versus from an administrator
How are participants engaging in communication possibilities?	Virtual	Frequencies of communication tools usage	Analysis of frequencies of message board communications, lines of chat, etc.; examination of "spamming behaviors"
Are the children engaging in conversations with all participants or only a few select "friends"?	Face-to-face & Virtual	Time-stamped chat logs with corresponding participant data	Structural analysis of chat logs

Attribute 2: Communication

Possible Evaluation Questions	Context	Data/Evidence Needed	Possible Analysis Methods
How does the communication amongst participants reflect the underlying social network of the world?	Virtual	Time-stamped chat logs with corresponding participant data	Social network analysis (Rosen, 2009; Rosen et al., 2003)

Table 11

Possible Implementation Evaluation Questions for the Attribute of Participation in a Virtual World Program.

Attribute 3: Participation

Possible Evaluation Questions	**Context**	**Data/Evidence Needed**	**Possible Analysis Methods**
Who is participating (gender, age, language)?	Face-to-face	Demographic data gathered during enrollment	Examination of demographic information
	Virtual	Demographic data gathered during enrollment	Examination of demographic information
How do participants engage in the program?	Face-to-face	Observation field notes; Attendance	Examination of field notes, attendance
	Virtual	Activity logs	Examination of activity logs

Attribute 3: Participation

Possible Evaluation Questions	Context	Data/Evidence Needed	Possible Analysis Methods
Are there any challenges to participation in the program (i.e., technical, time, etc.)? If yes, what can be changed in order to reduce the challenge?	Face-to-face & Virtual	Surveys and interviews with participants and on-site leaders	Review of surveys and interviews
Is there a difference in participation across demographic characteristics?	Face-to-face	Observation field notes, attendance; demographic data	Examination of participation data by demographic variables
	Virtual	Activity logs; demographic data	Examination of participation data by demographic variables
How does participation reflect what is expected (i.e., were there more girls? Were there more participants from a particular location?)	Virtual	Participation data on key variables (i.e., frequency of logins, time online; attendance at program)	Chi-square analysis to expected values

Attribute 3: Participation

Possible Evaluation Questions	Context	Data/Evidence Needed	Possible Analysis Methods
Is face-to-face participation different than virtual participation?	Face-to-face & Virtual	Participation data on key variables (i.e., frequency of logins, time online; attendance at program); Field Notes	Comparison of face-to-face participation data to virtual participation data
How is participation in the program occurring over time (i.e., how is it changing? Are participants returning?)?	Face-to-face	Observation field notes, attendance	Examination of field notes, attendance
	Virtual	Activity logs	Examination of activity logs
If based in an organization where attendance is not required: Why are some youth not participating? What are some of the barriers to participation (i.e., technical, interest, time, etc.)?	Virtual	Surveys and interviews with participants and on-site leaders	Review of surveys and interviews; pattern analysis

Table 12

Possible Implementation Evaluation Questions for the Attribute of Play in a Virtual World Program.

Attribute 4: Play

Possible Evaluation Questions	**Context**	**Data/Evidence Needed**	**Possible Analysis Methods**
How are participants engaging in play activities?	Virtual	Activity Logs; Chat Logs	Content analysis; statistical analysis
Do participants believe that the supports for play are adequate? What would they like to see changed?	Virtual	Participant Interviews	Content analysis

Attribute 4: Play

Possible Evaluation Questions	Context	Data/Evidence Needed	Possible Analysis Methods
How do participants' play behaviors correspond to their developmental stage?	Face-to-Face & Virtual	Activity Logs; Chat Logs; Demographic Information; Participant Interviews	Content analysis; statistical analysis

Table 13

Possible Implementation Evaluation Questions for the Attribute of Artifacts in a Virtual World Program.

Attribute 5: Artifacts

Possible Evaluation Questions	**Context**	**Data/Evidence Needed**	**Possible Analysis Methods**
What types of artifacts are users creating?	Face-to-face & Virtual	World observation data; Log files	Examination of field notes, log files
Who is creating artifacts? Are there demographic differences in who is creating the artifacts?	Face-to-face & Virtual	World observation data; Log files	Examination of log files; ANOVA analysis

Attribute 5: Artifacts

Possible Evaluation Questions	Context	Data/Evidence Needed	Possible Analysis Methods
How are the artifacts distributed in the world?	Virtual	Log files; Maps	Examination of log files, maps
When are participating creating artifiacts (e.g., immediately upon entrance to the world? After several visits? After chatting with another participant or mentor?)?	Virtual	World observation data; Log files; Chat log	Examination of field notes, log files, chat log
How are users customizing objects? Are users following the Code of Conduct for acceptable content?	Virtual	World observation data; Mentoring logs	Examination of field notes, mentoring logs

Attribute 5: Artifacts

Possible Evaluation Questions	Context	Data/Evidence Needed	Possible Analysis Methods
Are the object permissions as determined at the start of the program continuing to be acceptable as the program runs?	Virtual	Interviews with participants; World observation data	Review of interview transcripts or notes; examination of field notes
Do users find the objects that are available to them acceptable?	Virtual	Interviews with participants	Review of interview transcripts or notes
Are users able to use artifacts in order to create personally-meaningful projects?	Face-to-face & Virtual	Interviews with participants; World observation data	Review of interview transcripts or notes; examination of field notes

Attribute 5: Artifacts

Possible Evaluation Questions	Context	Data/Evidence Needed	Possible Analysis Methods
What are ways in which users are "thinking outside of the box" in terms of object creation and use?	Face-to-face & Virtual	Interviews with participants; World observation data	Review of interview transcripts or notes; examination of field notes
How is creation of objects occuring over time (e.g., are participants building consistently over time or just on first day?)?	Face-to-face & Virtual	World observation data ; Log files	Examination of field notes and log files
How are users representing themselves through avatars?	Virtual	Interviews with participants; World observation data; Log files	Review of interview transcripts or notes; examination of field notes and log files

Attribute 5: Artifacts

Possible Evaluation Questions	**Context**	**Data/Evidence Needed**	**Possible Analysis Methods**
If allowing for a collaborative environment, how are participants collaborating?	Face-to-face	Interviews with participants; Field notes	Review of interview transcripts or notes; examination of field notes
	Virtual	Interviews with participants; World observation data; Log files; Chat files	Review of interview transcripts or notes; examination of field notes, log files, and chat logs

Note: [a]*Data from obsevation within the world can be in the form of field notes, as a video created using screen-capture software during a walk-through, or as pictures created viaia screenshots*

Table 14

Possible Implementation Evaluation Questions for the Attribute of Policies in a Virtual World Program.

Attribute 6: Policies

Possible Evaluation Questions	**Context**	**Data/Evidence Needed**	**Possible Analysis Methods**
How is monitoring of the program policies occurring?	Face-to-Face & Virtual	Mentor field notes; World observation data; Log files; Chat files; Interview with mentors	Content analysis
In what ways are youth engaged in creating the policies of the program?	Face-to-Face & Virtual	World observation data; Log files; Chat files	Content analysis

Attribute 6: Policies

Possible Evaluation Questions	Context	Data/Evidence Needed	Possible Analysis Methods
Are youth adhering to the policies of the program? If no, in what ways? What are their reasons for violating the policies? Do their reasons reflect a potential change in program supports?	Face-to-Face & Virtual	World observation data; Log files; Chat files; Email communications	Content analysis
Are youth aware of the policies of the program? If yes, what way was the most successful in alerting them to the policies (i.e., Code of Conduct provided in enrollment information, democratic discussion of policies, etc.)?	Face-to-Face & Virtual	Participant interviews; World observation data; Log files; Chat files; Email communications	Content analysis
What types of policy breaches are occurring? Are they expected? How are mentors reacting to policy breaches? How do participants react to the "discipline"?	Face-to-Face & Virtual	World observation data; Log files; Chat files; Email communications	Content analysis

Table 15

Possible Implementation Evaluation Questions for the Attribute of Mentorship in a Virtual World Program.

Attribute 7: Mentorship

Possible Evaluation Questions	**Context**	**Data/Evidence Needed**	**Possible Analysis Methods**
How are mentors engaging with the participants? Are these interactions expected? If not, how are they different than expectations?	Face-to-Face & Virtual	World observation data; Log files; Chat files; Email communications	Content analysis
Are mentors completing the tasks for which they are responsible (i.e., reviewing chat logs, being online, submitting field notes? If not, why?	Face-to-Face & Virtual	World observation data; Log files; Chat files; Email communications	Content analysis

Attribute 7: Mentorship

Possible Evaluation Questions	Context	Data/Evidence Needed	Possible Analysis Methods
How do participants view mentors?	Face-to-Face & Virtual	Participant Interviews; World observation data; Log files; Chat files; Email communications	Content analysis
Have mentors been given enough training on the content of the program in order to be effective? On the technical aspects of the program?	Face-to-Face & Virtual	Mentor Interviews; Participant Interviews World observation data; Log files; Chat files; Email communications	Content analysis

Outcome Evaluation

An outcome evaluation “assesses the short- and long-term results of a project and seeks to measure the changes brought about by the project.” (W.K. Kellogg Foundation Evaluation Unit, 1998, p. 28). An understanding of the implementation and the outcomes are both important to evaluation of virtual world programs. Within the attribute framework, the outcomes of a program are reflected in the attribute of purpose. This is not to say that the other attributes do not contribute to the outcomes or the analysis of the outcomes. For example, to determine if an outcome was achieved (a component of *purpose*), the chat logs (*communication)* may be examined for their content.

The desired outcomes will be unique to each program, as described in previous chapters, and are reflected in the purposes of the program. Regardless of the specific content, programs should have the goal of supporting child development in an appropriate manner as one of their main intended outcomes. This means understanding the developmental stage of the youth participating (in the case of this work, preadolescents), developing curriculum that will support their key developmental tasks, and designing a program that meets these goals. In returning to the implementation evaluation questions for the attribute of purpose, an outcome evaluation of this attribute would ask: “Did participants use the program in a manner that corresponded to their developmental stage? Did the program support the developmental needs of the youth participants?”

The content goals and objectives are particular to the program. For example, for some programs, the desired outcome will be that youth increase their knowledge of a particular science topic, or youth develop a virtual community, or youth increase their medical adherence, or youth become skilled at creating video narratives that reflect a societal issue that is important to them, which are then showcased in the virtual world. Therefore, the data needed and analysis methods are contingent upon these outcomes. For example, in the case of the purpose being to increase science knowledge, participants should be given a test of objective knowledge specific to the content area before and after the program in order to analyze change. In the case of medical adherence, youth should be given already-developed questionnaires related to medical adherence. The program designers should determine, prior to the start of the program, what the specific purposes of the program in terms of content and what measures will be used to analyze the data. The data necessary to analyze these outcome questions are the same as the types listed in the implementation evaluation section: a combination of qualitative and quantitative, from both face-to-face and virtual interactions.

All programs need an evaluation plan. Implementation evaluation activities allow programs to understand *how* their program was executed, which in turn allows for a better understanding of the program, an opportunity to address "red flags" before they compromise the program, and a chance to make modifications to the program for future iterations. Outcome evaluation activities allow programs to understand what effects their program has on their target audience. Evaluation of virtual world programs requires a variety of analysis techniques and an assortment of data types. As the concept of virtual world programs is relatively new, evaluation activities, especially when shared with the larger community, will produce programs that are better able to support the development of youth.

Chapter 7: The Application of the Attribute Framework to the ClubZora Project

This chapter presents the application of the attribute framework to the ClubZora project, using a case study approach to focus on the implementation of the program, per the second research question guiding this dissertation study: *How can virtual world programs for children be evaluated in order to understand both the process by which the program is implemented and the outcomes achieved by the program?*" This application will illustrate how the attributes can be used in evaluation of an virtual world program.[44]

In particular, this chapter focuses on presenting a case study evaluation of the implementation of the ClubZora project using a variety of methods. As mentioned in the previous chapter, the overarching questions guiding this implementation evaluation are:

(1) How was the program being used by participants?

(2) How can the program be improved?

(3) How did participant use of the program compare to initial expectations?

To address these questions, I will discuss each attribute as it corresponds to the ClubZora project, linking, when possible, to the specific evaluation questions presented in Chapter 6. As discussed previously, in design-based research and in program evaluation, program administrators should at frequent intervals assess their project to determine if changes need to be made. As such, in the following sections, I will describe both successes and failures that occurred during the

[44] Portions of this chapter have been published in Beals and Bers (2010).

project. For the latter, I will provide possible solutions to minimize similar situations in future virtual world programs. However, most of the general lessons that were learned from the ClubZora project are presented in Chapter 5, in the discussion of the design of virtual world programs. Therefore, I will only be focusing on new and specific recommendations in this chapter. Finally, it is important to remember that the attributes are not mutually exclusive—they are intrinsically connected such that a problem in one attribute can often lead to a problem in another.

Attribute 1: Purpose

As described in the previous chapter, one of the key purposes of evaluation is to understand implementation challenges and failures in order that they may be addressed for future programs. Some of the evaluation questions for the attribute of purpose are (Chapter 6, Table 9): *Do participants understand why they are part of the program? What do they believe the purpose(s) of the program is (are)? How does this match the program's planned purpose(s)?* The ClubZora project is an example of a program in which the purpose was *not* clearly understood by participants, as will be described in detail below. However, the failure in this component of the project was what made me realize that a clear *purpose* is an essential attribute of virtual world programs; this cycle of design-implementation-redesign in order to further refine the attribute framework is an essential component of design-based research. Therefore, this failure within the program, at least initially, was transformed into a success, as it greatly improved the attribute framework.

In examining this challenge in more detail, as shown in Figure 8 and Figure 9, the project had an initial surge of participation, with a decrease in enrollments and logins over time; this corresponds to the evaluation question (Chapter 6, Table 11): *How is participation in the program occurring over time (i.e., how is it changing? Are participants returning?)?* I hypothesize that this decrease in usage was due to two main reasons: (1) participants did not know “what to do” in Zora once they entered the world, and hence did not have a clear understanding of the *purpose* of the project, and (2) *communication* challenges between project administrators and enrollees (to be discussed in the attribute of communication).

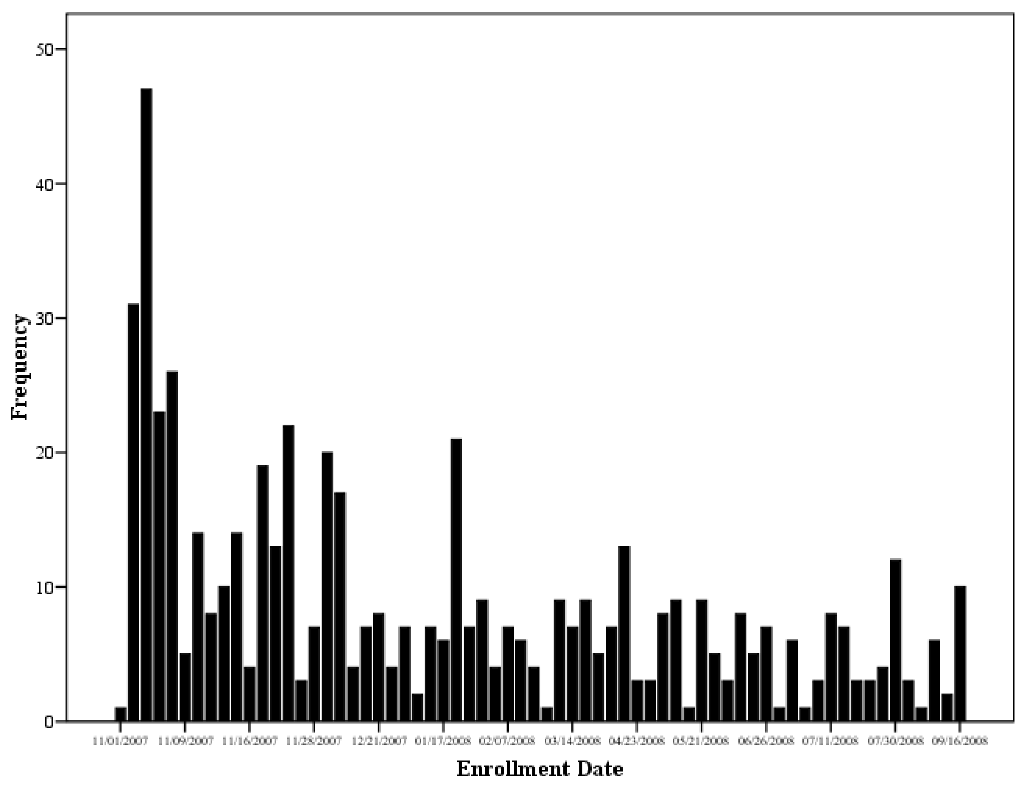


Figure 8. Frequency of enrollments in the ClubZora project over time.

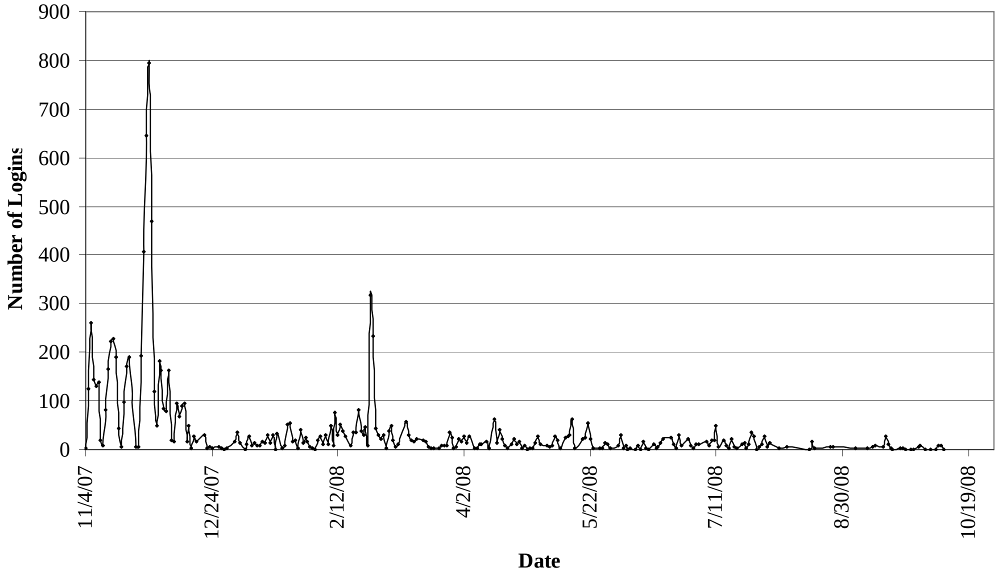


Figure 9. Logins to ClubZora by all participants (youth, Coordinators/Mentors, and project administrators) over the duration of the project.

As for not “knowing what to do,” it is important to note that the ClubZora project spanned nine months, with users joining the project throughout the duration. As discussed in the description of the attribute of purpose in Chapter 4, as members participate in a project, there needs a continuous sense of purpose—participants need to know why they are using the software and why they are participating in the project both at the beginning and throughout (Beals & Bers, 2009). When the ClubZora world was originally conceived, the staff based the design on previous projects, in which very little of the virtual world was pre-populated. This gave participants the opportunity to develop the world from scratch; the main purpose of the project, as originally conceived, was to give youth from the Computer Clubhouse Network a chance to work together to create a virtual city in which they could display their artwork and other digital projects.

In addition, a second original purpose of the ClubZora project was to foster a virtual community of Clubhouse members. However, a minimally pre-populated world turned out to not be an ideal model for such a large population of users for two main reasons: too many artifacts and not enough structure. These reasons will be discussed in detail below in the attribute of artifacts. This is a good example of how the attributes are interrelated—because of issues that occurred within the attributes of *communication* and *artifacts*, the attribute of *purpose* was significantly impacted, which in turn impacted the attribute of *participation*.

Attribute 2: Communication

There are two main components to communication—communication between participants and communication between project administration and participants. Figure 10 highlights the communication between participants; it shows the lines of chat, over 35,000, recorded by all participants (youth, Coordinators/Mentors, and project administrators) during the course of the project. As with the other metrics, such as enrollments and logins, the lines of chat also decreased over time, though this is not surprising considering that in order to chat, one must be logged into the program.

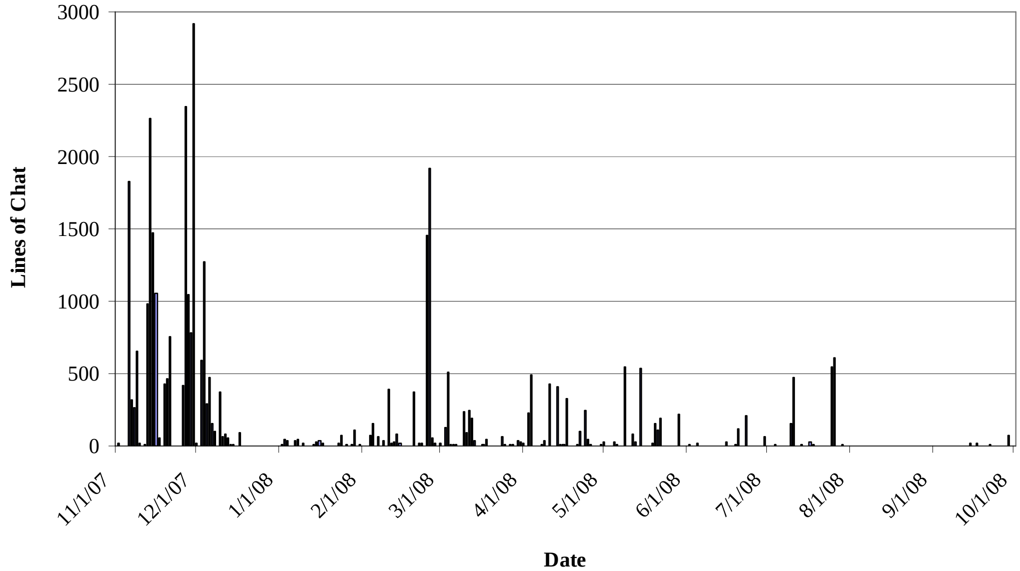


Figure 10. Lines of chat in ClubZora by all participants (youth, Coordinators/Mentors, and project administrators) over the duration of the project.

Despite the decrease over time in the number of lines of chat, the chat was one of the most active aspects of the ClubZora virtual world. However, because both English-speaking and Spanish-speaking youth participated in the project, there was occasionally tension in the chat. For example, often in ClubZora users tried to have conversations “between” each other—the chat would have two conversations, one in English and one in Spanish, occurring simultaneously—and the youth on occasion expressed annoyance when they could not understand the other conversation. As an example of this, one user wrote in the chat during a time when both English and Spanish were being used: “*stop speaking spanish i don't speak spanish i'm English.*” In a similar situation, another user chatted: “*TALK ENGLISH NOW*.”

Related to this issue of supporting both Spanish and English, while many of the Zora Ambassadors in the ClubZora project were bilingual, I as the project coordinator was not. Therefore, I had to use my limited knowledge of Spanish along with Google’s translation tool in order to communicate with Spanish-only users in the chat system. Because of the delay stemming from first translating their conversation and then my response, I often could not keep up with the chat, which was frustrating to users. In addition, some Spanish speaking youth tried to “take advantage” of my limited Spanish speaking abilities by using inappropriate language. Fortunately, I was able to understand when this was occurring and was able to mediate the situation. Furthermore, as there were many active participants from Latin America who were able to speak both English and Spanish, I was able to enlist their help to communicate with those participants who only spoke Spanish. Supporting multiple languages, which was important to this project due to the nature of the host organization, at times can be difficult, but when properly planned for, can provide a richness of experience for all.

As for communication between the project administration and participants, this was an area in which unforeseen problems greatly impacted the outcome of the project. The corresponding evaluation questions are (Chapter 6, Table 10): *Are participants receiving communications from administrators? Are participants acting on the communications (e.g., announcement of activity/event)?* The following example from the ClubZora project illustrates how a program’s success can be impacted by issues in communication between project administrators and users.

The ClubZora project coordinator did not find out until several months into the project that the emails that she was sending to the enrollees were not received. As part of the enrollment process, enrollee's provided Village email accounts for communication, which included sending enrollees' information about their usernames and passwords, announcing group activities, and responding to questions. When the project administrator sent out emails to the entire participant list, announcing activities or other important information about the project, a blind-carbon-copy (bcc) method was used to hide the email addresses of recipients for security. However, there was a bug in the Village email system by which emails with bcc's were not distributed to recipients, without an error message being returned to sender. The nature of the Village email system prevented her from knowing about this bug until she conferred with Clubhouse staff regarding low turnout for planned activities. Subsequently, this bug was addressed in the Village email system; however, this was not until several months into the program (i.e., after the initial "buzz" about the program may have decreased).

Even after this specific problem was addressed, emails often bounced back to the sender, indicating errors in how a member had set up his/her email in *The Village*. In addition, the Village email system is designed to not allow messages from addresses outside the system and subsequently youth may not use this account frequently. However, statistics regarding how many members use their Village emails and how often are not available; therefore it is unknown whether this was a viable method of communication with the youth. For example, the project coordinator received 223 duplicate requests for enrollment, suggesting that the first confirmation email was not received or viewed. In order to avoid errors such as this for subsequent projects, two lessons are learned: (1) project administrators should always check their communication system *exactly* as planned and ensure that messages are being distributed to participants using an alternate method such as a telephone call or face-to-face interview and (2) when possible, request two emails addresses be gathered during the enrollment process—one for the organization (if applicable) and a “preferred” email address, if different from that assigned by the organization.

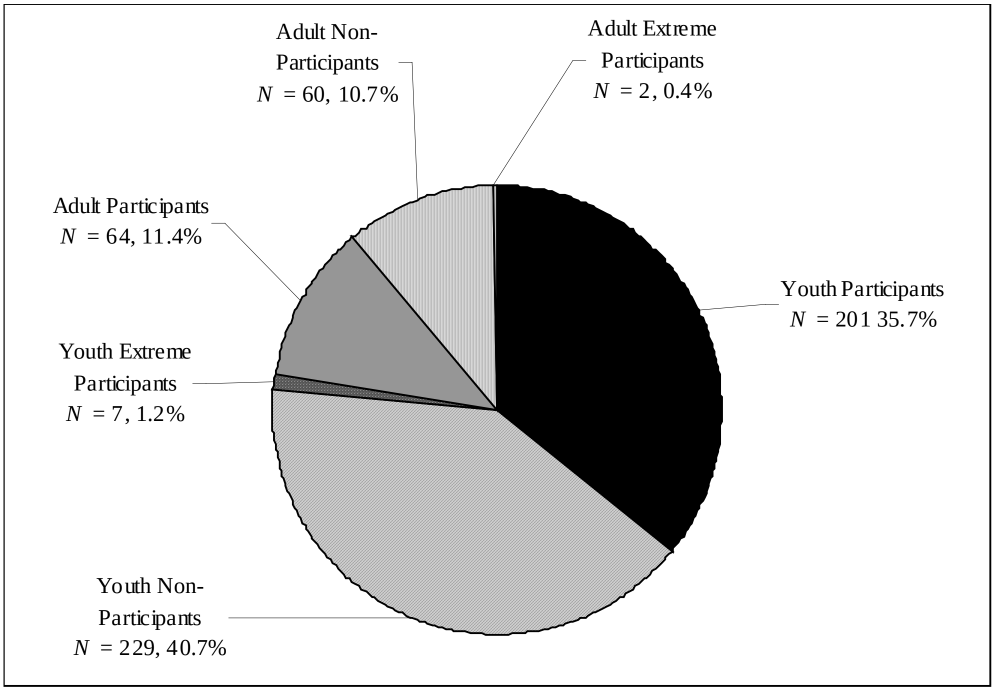
Another communication challenge was that users were not able to easily see who else was online. Though there was a user list available in the web-based portion of the Zora software, which showed who was online, it was sorted alphabetically, not by status, and it was not automatically updated. This feature of ClubZora was modified in future projects so that the names and statuses of participants who were online would “bubble” to the top of the list and the page would automatically refresh itself.

Attribute 3: Participation

The attribute of participation was examined thoroughly in the ClubZora project due to the large number of enrollees (over 550) relative to other projects completed previously by the DevTech Research Group, which on average had fewer than 30 participants/members. It was important to understand *who* participated, or in the case of this project, also who did *not* participate, as well as *how* members participated in order to better understand the program within the context of the Computer Clubhouse Network. First I will examine overall enrollment, usage, and region representation, next youth participants, and finally, youth nonparticipants, as this examination corresponds to the evaluation questions (Chapter 6, Table 11): *Who is participating (gender, age, language)?* and *How do participants engage in the program?*

Overall enrollment and usage. During the 11 months of the ClubZora project, 563 Clubhouse members requested enrollment: 437 youth and 126 Coordinators/Mentors. Enrollees were divided into five groups (Figure 11): youth participants (*N* = 201), Coordinator/Mentor participants (*N* = 64), youth nonparticipants (*N* = 229), Coordinator/Mentor nonparticipants (*N* = 60), and Extreme Users (*N* = 9).[45] As will be discussed in more detail below, having information about the youth who enrolled but did not participate in the project is important, as it may provide information about how to improve appeal and retention for future projects. In addition, other projects that have similar information about nonusers could attempt to contact these enrollees in order to survey them as to their reasons for not participating in the project.[46] This would provide invaluable feedback for project administration and designers in order to allow for a better understanding of how the target audience perceives the program and the software.

[45] Information regarding method for the distribution of participants and criteria for inclusion into these groups can be found in Appendix E.
[46] Due to limitations set forth by the IRB for the ClubZora project, project administrators were not allowed to connect the online youth to the “real life” youth, and therefore we could not directly contact youth in this manner.



Fig

Overall, participants logged in over 9,800 times, spent 430 hours in Zora, created more than 52,000 objects, and recorded over 35,000 lines of chat. Figure 12 shows a map of the locations of the Clubhouses from where enrollees came.

Figure 12. Map of ClubZora enrollee Clubhouses.

Region representation. These enrollees represented 84 Clubhouses, 19 countries, and all eight Clubhouse regions: the United States (including the Northeast, Southeast, Southwest, and West Coast), Asia Pacific, Europe, the Middle East-Africa, and Latin America. The Clubhouses most represented by enrollees were from the United States, though there was a large Latin American representation for this project. The high number of enrollees from the United States is not unexpected, however, because over two-thirds of the Clubhouses are located within the United States and the primary language of the software and project administration is English, naturally drawing members from the United States. In an ideal case, the software and support materials should be available in all of the languages used by potential participants. However, this ideal case is one that is very expensive and time-intensive; for example, the materials, software, and logs would have to be translated, additional programming may be required for the software to support different language versions, and it may require staff who are fluent in those languages.

The high prevalence of enrollees from Latin America may be attributed to support materials written in both Spanish and English and that Spanish, using the Latin character set, could easily be integrated into Zora, as opposed to languages using a non-Latin character set, such as Chinese or Arabic. Also, the Clubhouse staff liaison to the ClubZora project was in charge of that region, and was therefore able to encourage her contacts to join. In addition, she invited the project administrator to introduce Zora at the meeting of Latin American Coordinators at the yearly Coordinator conference prior to the project launch and she organized a group meeting of Coordinators from Latin America in Zora in December of 2007 (see Figure 13), thus increasing their knowledge of Zora's existence. The liaison also was a native-Spanish speaker and so was able to communicate easily with Coordinators and members from that region. Based on these findings, future implementations of projects such as these should have "champions" of the project, who are known to staff and members of the organization, in order to encourage participation.

Figure 13. Screenshot from a day in December 2007 when Coordinators and members of several Latin American Clubhouses met in Zora.

Finally, the United States and Latin America, for the most part, share time zones. The project was based in Massachusetts, and thus many of the activities were planned during the afterschool hours of members in those common time zones (Eastern Standard Time through the Pacific Time Zone). Though members from other time zones could use Zora whenever they wanted, it was less likely that there would be someone else online during that time; this is an essential component of critical mass theory as discussed in Chapters 3 and 4. Informal feedback[47] from Coordinators, regarding what they thought members liked the least about Zora, provided two examples supporting this idea: "*They* [members] *didn't profess any dislikes other than they wished more people were on there at the times they were on there*" and "*Not having enough people to interact simultaneously*." If staffing allows, international projects in which it is important for participants to use software synchronously should attempt to have activities during times that cross all time zones represented by participants. Barring that possibility, perhaps engaging the time of a Coordinator or Mentor in each of the other time zones to lead an activity during that zone's afterschool hours would be helpful. Therefore, targeting the time zone in which the majority of users would be online would probably be a better use of staff time and resources.

Youth participants. In the sections below, I will only focus on the youth who enrolled in the project (Figure 11); there were approximately equal numbers of youth participants (*N* = 201) and nonparticipants (*N* = 229), plus seven extreme users. In addition, these sections correspond to the following evaluation questions (Chapter 6, Table 11): *Is there a difference in participation across demographic characteristics?* and *How does participation reflect what is expected (e.g., were there more girls? Were there more participants from a particular location?)* Overall, there were 201 youth participants (36% of the total enrollees). In addition, 150 (74.6%) indicated English as their preferred language and 51 (25.4%) indicated Spanish. The youth participants represented 40 Clubhouses, 11

[47] All informal feedback is presented as stated/written, unless otherwise stated (i.e., no grammatical errors have been edited).

countries and all eight regions represented by the Clubhouse Network (more detailed information can be found in Appendix F, Table F1 and Table F2). Table 16 provides information about usage of Zora for youth participants.

Table 16

*Usage of the Zora Software by Youth Participants in the ClubZora Project (*N = *201).*

	N	*Minimum*	*Maximum*	*M*	*SD*
Time Online (min)	201	1.21	415.03	56.16	74.00
Number of Logins	201	0.18	109.34	18.50	26.24
Lines of Chat	128	0.29	1,401.18	81.35	170.62
Number of Objects	116	0.21	2,085.72	57.39	227.52

There was a significant difference between the number of objects created by Spanish speakers than English speakers ($F(1,114) = 4.28$, $p < 0.05$), with Spanish speakers creating more objects ($N = 34$, $M = 124.27$, $SD = 378.04$) than English speakers ($N = 82$, $M = 29.65$, $SD = 112.32$).[48] However, there was not a significant difference in the time online ($F(1, 199) = 2.11$, $p > 0.05$), the number of logins ($F(1, 199) = 0.35$, $p > 0.05$), or the lines of chat ($F(1, 126) = .82$, $p > 0.05$) between English and Spanish speakers.

[48] For all statistical tests described in this chapter, an alpha level of .05 was used.

There were no significance differences in usage based on region or age for participant youth (see Appendix F, Table F3 and Table F4 for the ANOVA results). Furthermore, a Pearson correlation addressed the relationship between lines of chat (M = 81.35, SD = 170.62) and number of objects (M = 57.39, SD = 227.52) for participant youth. The correlation between lines of chat and number of objects was found to be statistically non-significant, $r(97) = .178$, $p > .05$.

A chi-square test of goodness-of-fit was performed to determine whether there was a difference between the distribution of gender, age, region, and language from ClubZora youth participants and that which would be expected from *The Village* population, based on expected values provided by Village staff. Results indicate that there was a statistically significant difference between the distribution of gender, age, region, and language from ClubZora youth participants and that which would be expected (see Appendix F, Table F5 for the results of the chi-square test and Table F6 for the observed and expected values).[49]

The age of youth participants. The average age of the youth participants was approximately 12 years (SD = 2.56 years), with a range of 8 years to 18 years (all ages served by the Clubhouse). In addition, there were more youth participants ages 9 to 13 than would be expected based on Village enrollment. Though all Clubhouse Network members were allowed to join the project, the Zora software and this project were aimed at youth between the ages of 11 and 15 and thus this average age is within expectations. Similarly, the most recent *Youth*

[49] *The Village* data about language was provided for all users, not just youth.

Impact Report (Gallager, 2008) from the Clubhouse Network reported that half of the members responding to the survey were between 11.7 and 15.5 years (median = 13.6 years). In addition, the *Quarter 3 and 4 Clubhouse Report* (The Intel Computer Clubhouse Network, 2008), reported that the daily average percent of teen members was 58, indicating that 42% were younger than 13 years, which is quite a large proportion of the population of youth attending the Clubhouses. This finding is further supported by a recent Pew Internet and American Life report regarding video games usage by teens which found that younger teens, 12 to 14 years, were the most avid gamers and that furthermore, younger teens are more likely to use virtual worlds than older teens (Lenhart et al., 2008). Though Zora is not in itself a video game, it may appear to be similar to one for participants and thus the report findings may support those from this project. Though it was anticipated that this age group was the target audience for the ClubZora project, these findings confirm that the project is appealing to this age group. However, it does suggest that for future projects such as this, to which a wide range of ages could be catered (i.e., 8 years to 18 years is a large range for an intervention), the curriculum for and methods of communication with younger youth should be explored in more detail.

Informal post-project survey feedback from Coordinators further reinforces that Zora was best enjoyed by the younger members of the organization: "*Zora was really popular with the Under 12s* [sic]. *The activities on Zora were a good way to put some focus in Zora and learn about how to use it, but they really had fun just wandering around*" and "*I encouraged members to* *complete the activities in Zora, but it was most appealing to the younger members who enjoyed building houses and walking around."* However, there were no statistically significant differences in how the program was used based on age, at least for the usage variables that were recorded (time online, number of logins, number of objects, and number of lines of chat). This suggests that while it might be used more by younger youth, those youth who did decide to interact with Zora use it the same regardless of their age. The Zora software has been used with older youth, including college students (Bers, Beals, Chau, Satoh, & Khan, 2010; Bers & Chau, 2006, 2010), suggesting that it can be used, in conjunction with an appropriate curriculum, for a wide range of ages. The results from this evaluation do suggest that Zora is initially more appealing to younger youth, though this may be due to the makeup of the organization's population. Therefore, future projects of a similar nature should attempt to understand the ages of the target population for the intervention, as well as the ages of the youth who, based on the history of the organization, are most likely to engage in projects such as this one, as the two ages may be different. Improved knowledge of the distribution of the ages of the target population would allow for the curriculum, and surrounding supports—including staffing, materials, etc.—to be best tailored to the youth who will be using the program.

The gender of youth participants. Of the 201 youth participants, 130 (64.7%) were male and 71 (35.3%) female. This finding is supported by the *Quarter 3 and 4 Clubhouse Report* (The Intel Computer Clubhouse Network, 2008), which indicated that the daily average percent female attendance in the

Clubhouses was 40, only a slightly higher percentage than was present in this population. In comparison to *The Village* population, there were more male youth participants and fewer female youth participants in this project than would be expected. In the recent *Youth Impact* report, a similar finding—a higher proportion of boys responded to the survey—was also found (Gallager, 2008, p. 5). These findings, especially considering the statistically significant difference in comparison to *The Village* population, suggest that Zora is more appealing to male users. As the aim of most interventions are to be equally appealing to all potential users, and the fact that certain technologies can exacerbate gender differences in program usage, it would be important for future projects to better understand the aspects of Zora that do and do not appeal to males and females, perhaps in the form of a focus group.

There was a significant difference between youth participant males and females in the time they spent online and the number of logins ($F(1,199) = 8.48$, $p < 0.01$; $F(1,199) = 7.35$, $p < 0.01$), with boys spending more time online and logging in more (N = 130, $M = 67.19$, $SD = 79.79$, $M = 22.15$, $SD = 28.72$) than girls (N = 71, $M = 35.96$, $SD = 57.21$, $M = 11.82$, $SD = 19.43$). However, there was not a significant difference between males and females in the number of objects they created or the lines of chat recorded ($F(1,114) = 1.76$, $p > 0.05$; $F(1,126) = 0.12$, $p > 0.05$),[50] despite there being more male participants in the project and boys spending more time online and logged into the software. The difference between girls and boys in terms of time online and number of logins is

[50] I recognize that it is not usual to report nonsignificant results. However, as this is an evaluation of a program, nonsignificance in differences in usage is an important result, as will be discussed in the next section.

reflected more general trends about gender differences in video game use (Lenhart et al., 2008).

However, the lack of differences in usage is similar to findings presented in the *Clubhouse Youth Impact Report*, in which only one of the seven activities listed had more than a 10 percentage point difference between boys and girls (Gallager, 2008). The result that there were no differences in building or chatting between boys and girls though there was a difference in terms of logins and time online suggests that girls, when using the software, were more focused on building and chatting, while the boys spent more time engaging in other types of activities in Zora, such as playing chase, just walking or running around, or engaging in role-playing like activities. This is supported anecdotally, as the project coordinator spent many sessions playing hide-and-seek, tag, or racing a male youth in the world. Other sessions were spent in engaging in role-playing-game-like activities in "Area 34"—a compound created by several members from the same Clubhouse in which the project coordinator had to navigate through several rooms and wait her turn to speak with the commander. This will be explained in more detail in the attribute of play.

These differences in time spent online and number of logins further support the use of a focus group to explore in more detail how males and females use the program. Unfortunately, the Zora software is currently unable to track a user's movements through the world over time, though this has been done with other projects using the Active Worlds platform (Penumarthy & Borner, 2006). Therefore, a focus group, or series of focus groups, in which the actions of the youth are recorded and feedback gathered based on their experiences with the program, may allow for a better understanding of how males and females use the software. This would in turn allow for the software design and curriculum development to be best tailored to the needs of each group.

Youth nonparticipants. Of the enrollees in the project, 229 (41%) were nonparticipant youth, defined as participants who logged in less than two times and spent less than four minutes logged into the program. They represented 56 Clubhouses, 16 countries, and all 8 regions of the Clubhouse Network (more detailed information can be found in Appendix F, Table F7 and Table F8). As mentioned previously, an understanding of who did not participate in the program can be important for improving future implementations of the program; this section therefore corresponds to the following evaluation questions (Chapter 6, Table 11): *If based in an organization where attendance is not required: Why are some youth not participating? What are some of the barriers to participation (e.g., technical, interest, time, etc.)?*

A chi-square test of goodness-of-fit was performed to determine whether there was a difference between the distribution of gender, age, region, and language from ClubZora youth nonparticipants and that which would be expected from *The Village* population, based on expected values provided by Village staff. Results indicate that there was a statistically significant difference between the distribution of gender, region, and language from ClubZora youth participants and that which would be expected from *The Village* population. However, there was not a statistically significant difference between the distribution of age on

ClubZora and *The Village* (see Appendix F, Table F9 for the results of the chi-square test and Table F10 for the observed and expected values).[51]

As with the participant youth, two-thirds (62.4%) of the youth nonparticipants were male and approximately three-fourths (77.7%) spoke English. This similarity suggests that there were no gender or language reasons for not choosing to participate in the project. The average age of youth nonparticipants was 13 years (*SD* = 2.7), one year older than the average age of youth participants though still on the younger end of those youth served by the Clubhouse Network. In comparison to youth nonparticipants in *The Village* population, there was a significant difference between the expected numbers based on gender, region, and language, a similar finding as with participant youth. However, there was not a difference based on age, as was found with participant youth, reinforcing the previous finding that Zora was most attractive to younger members of the Clubhouse network.

Of the 56 Clubhouses that were represented by nonparticipant youth, 18 Clubhouses did not have a participant youth (i.e., the remaining 38 had at least one participant youth). Of these 18 Clubhouses, 10 also did not have a participant Coordinator/Mentor. This suggests that the software may not have been available in the Clubhouse, perhaps due to technical issues with the software. Since Zora is a stand-alone application, it needs to be installed on each computer before being used. Often Clubhouses have different computer setups (both in terms of hardware and software), and even within an organization computers may have

[51] *The Village* data about language was provided for all users, not just youth.

different configurations, possibly making it difficult to install the software consistently on computers available to members. In addition, due to the connection to the Active Worlds server required to use Zora, several Clubhouses reported difficulties in connecting due to firewall and security settings in place at the Clubhouses for the protection of members. For example, one Clubhouse Coordinator with whom the project coordinator worked extensively was able to connect to Zora via the the wireless Internet connection on his laptop, but was not able to get the computers available to members, which were on a wired connection, connected to Zora.

As one may imagine, this inability to connect to Zora, combined with the various levels of technical expertise of the Coordinators, was likely frustrating to both Coordinators and members, causing them to discontinue use of the software. While this issue does not pertain only to nonparticipants, and could possibly be the reason for low participation in other groups, the technical difficulties surrounding Zora present challenges to the implementation of projects such as this. While other 3D virtual world programs, such as Second Life, also require a stand-alone application, many programs popular with youth are accessed via a web-based interface, such as Neopets and Club Penguin, with no additional software needed. However, a web-based interface does increase the chance that the software would be used in a location other than the Clubhouses, which for this project was not desirable. While there are, of course, "pros and cons" to each of these methods of software delivery, it would behoove those interested in future virtual world programs to explore their particular organization's technical status and abilities, as well as the requirements for program access in order to determine the best tool.

Ideally, project administration should attempt to gather information from these youth as to why they did not participate in the project, as their responses could provide valuable insight into potential program improvements. For example, was their Coordinator not able to install the software? Did they not receive their confirmation email? Taking it one step further, gathering information regarding the appeal and use of the project from those members who did not even enroll in the project would be valuable. However, this information may be difficult, if not impossible, for a program to obtain.

Attribute 4: Play

The ClubZora program did not have any games natively built into the software or into the curriculum. However, participants made their games which took two forms: role-playing games and chase/tag/hide-and-seek games. This shows how important play is as an attribute in this framework. Examination of this attribute, as described below, relates to the following evaluation questions (Chapter 6, Table 12): *How are participants engaging in play activities?* and *How do participants' play behaviors correspond to their developmental stage?*

Role-playing games. Several of the members used the Zora virtual world as a place to participate in role-playing games. These members would invent fictionalized personas and build objects pertaining to that persona. Then, as the fictionalized personae, they would enact elaborate situations using their built creations as part of the “story.” The most established of these occurred with a group of users who were all from a Clubhouse in California. These users created a compound that they dubbed “Area 34.” In Area 34 they assembled a series of houses stacked on top of each other, accessible via stairways. Within the rooms of the house they created offices, waiting areas, and other rooms from which to “command” those who joined their play (Figure 14 and Figure 15).

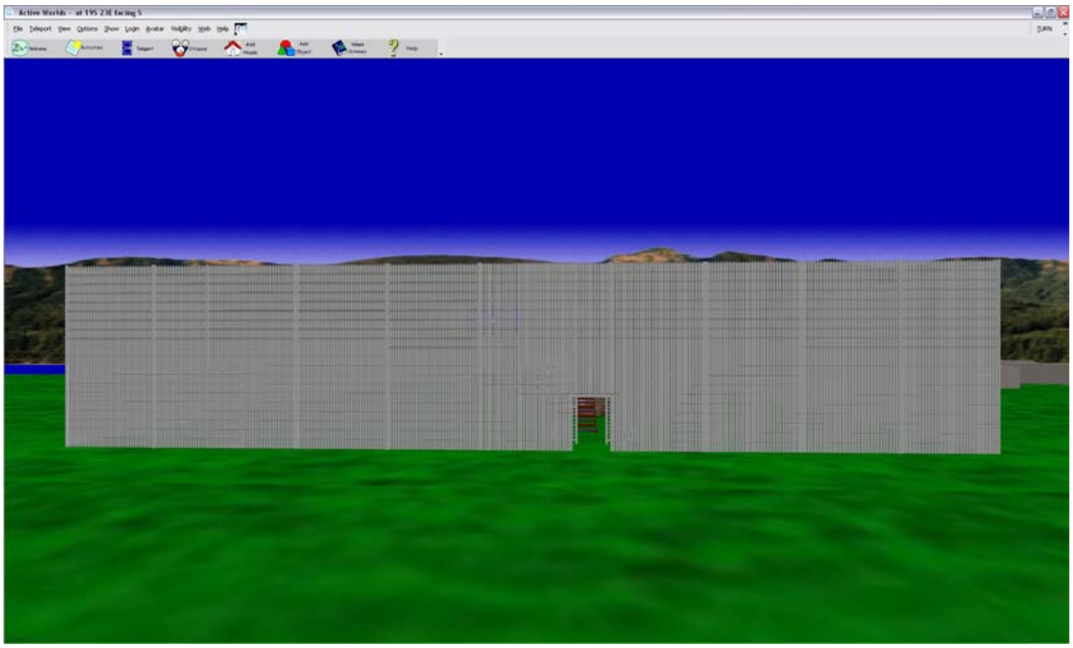


Figure 14. Screenshot of the outside of “Area 34.”

Figure 15. Screenshot of the inside of “Area 34.”

The following dialog, which occurred in November of 2007 between youth members of a Clubhouse in California, illustrates how these preadolescent youth used Zora to play a role-playing game. Because this is a long conversation, only a single excerpt is presented below (see Appendix G for the full transcript). Though long, it is included to show how their game was sustained over several hours that day. Table 17 provides demographic information about the users in order to provide additional context to the conversation; it should be noted that all of the participants except myself, Edwina (a Zora Ambassador), and erickad were all from the same Clubhouse.

Table 17

Username, Age, Gender, and Role Information for Participants Playing in "Area 34," as Reflected in the Chat Log in Table 18.

Username	**Age**	**Gender**	**Role**
Laura	Adult	Female	Project Administrator
Edwina	Adult	Female	Zora Ambassador
blacktooth	17	Male	Youth
stingy42	15	Male	Youth
erickad	13	Female	Youth
theprincess	12	Female	Youth
mrice1995	12	Female	Youth
gameruler	12	Male	Youth
cookie1995	12	Male	Youth

Table 18

Excerpt of Chat Conversation on November 17, 2007 Regarding Role-Playing in "Area 34." Entire Conversation can be Found in Appendix G.

Name	**Time**	**Message**
blacktooth	02:41:13	Cmdr. Meowmix please report to the Main Complex. Thank you.
Stingy42	02:41:20	Fine...
blacktooth	02:47:20	This is 34 command. Lunch will be served today in Cmdr. Meowmix's private quarters. All soldiers and non-essental crew should report there for their daily rations.
gameruler	05:22:51	come with me
gameruler	05:23:35	come with me laura
Laura	05:23:39	Ok
gameruler	05:24:13	go to area 34
mrice1995	05:25:36	Hey were is area 34
Laura	05:25:43	Wow
Laura	05:25:47	that is pretty amazing!
gameruler	05:26:13	come in
Laura	05:26:20	nice job!

Name	Time	Message
gameruler	05:26:36	Read
Laura	05:27:05	Haha
gameruler	05:27:13	Laura
Laura	05:27:15	do i have to leave my name *(They had created a sign outside the entrance to the commander's office that asked people in the waiting area to put their name on a waiting list to see the commander. See Figures 16 and 17).*
gameruler	05:27:22	no
gameruler	05:27:28	come here
Laura	05:27:36	i see
Laura	05:27:46	i have to wait for you to let me enter
Laura	05:27:47	clever
gameruler	05:28:04	do you wount to talk to cmdr. meowmix
Laura	05:28:09	sure
Laura	05:28:12	that would be great
Laura	05:28:17	if he allows
gameruler	05:28:25	you can go up now
Laura	05:28:41	how do i get there>
Laura	05:28:44	you need a sign
gameruler	05:28:44	come with me
Laura	05:28:49	ah! escorted!
gameruler	05:29:19	plz wat here
Laura	05:29:22	ok
gameruler	05:30:11	give thim a message
Laura	05:30:23	a message? how?
gameruler	05:30:37	you now how
Laura	05:30:37	on the sign?
gameruler	05:30:49	yes right clik
gameruler	05:32:24	plz come with me if you are doun
Laura	05:32:29	ok
gameruler	05:33:27	i will tell cmdr later sary to bother you
Laura	05:33:50	no bother. i appreciate the time. please pass my regards to the cmdr
gameruler	05:34:42	he is on now
Laura	05:35:17	well if he can find the time to fit me in

(Conversation continues. The entire conversation can be found in Appendix G)

Figure 16. Waiting area for Commander Solaris in "Area 34."

Figure 17. Waiting area for Commander Meomix in Area 34.

As shown in this example dialog, these youth users created personas for themselves, built objects that were needed in order to act out the personas, and then acted out their characters. As I was not in the same Clubhouse as these youth, I am not certain how much off-line interaction occurred around the creation of and engagement in “Area 34” gameplay. However, I do know that role-playing was one of the main activities that youth participants engaged in during their time on Zora during the ClubZora project.

Chase, tag, and hide-and-seek games. Another favorite type of game played by preadolescent youth participants in the ClubZora project was chase/tag/hide-and-seek. The participants would gather together at a location in the world then run and hide. Because the chat system was set up so that all users could see the chat regardless of where they were in the world, it was easy to “count down” and actually play hide-and-seek or tag. The following conversation shows an example of the “hide and seek” behaviors of participants (Table 20). This conversation between three ClubZora participants, which lasted almost an hour, occurred on November 16, 2007, a few days after the start of the project. Table 19 provides the demographic information about participants.

Table 19

Username, Age, Gender, and Role Information for Participants Playing Hide-And-Seek, as Reflected in The Chat Log in Table 20.

User	Age	Gender	Role	Clubhouse Location
carleneg	13	Female	Youth	TX
marcyk	13	Female	Youth	TX
gameruler	12	Male	Youth	CA
erickam	11	Female	Youth	TX
kc1999	8	Male	Youth	CA
beny	Adult	Male	Clubhouse Mentor	TX

Table 20

Excerpt of Chat Conversation on November 16, 2007 Showing how Participants Played "Hide-and-Seek." Entire Conversation Can Be Found in Appendix H.

Name	Time	Message
gameruler	6:18:13	lets do something fun hid and sik
erickam	6:18:22	ok
gameruler	6:18:23	your it
gameruler	06:18:32	cont to 20
erickam	06:18:33	You better run
erickam	06:18:37	ok
carleneg	06:18:53	im playing too
gameruler	06:19:03	ok hide
erickam	06:22:16	carlene is stunck in the water
carleneg	06:23:01	10
erickam	06:23:38	carlene is it
carleneg	06:24:16	ur it
erickam	06:25:43	carlene is it
carleneg	06:25:50	hey gameruler
erickam	06:25:57	Where are you gameruler
gameruler	06:26:31	whos it

Name	Time	Message
carleneg	06:26:37	you are now
erickam	06:26:37	Carlene
erickam	06:26:55	Carlene has to count
carleneg	06:27:13	tag
gameruler	06:27:41	tag
carleneg	06:27:48	gameruler you are it count to ten
carleneg	06:28:11	who did you tag
gameruler	06:28:16	tag
gameruler	06:28:21	you
carleneg	06:28:33	ok ill count
carleneg	06:28:36	1
carleneg	06:28:38	2
carleneg	06:28:40	3
carleneg	06:28:42	4
carleneg	06:28:44	5
carleneg	06:28:46	6
carleneg	06:28:48	7
carleneg	06:28:49	8
carleneg	06:28:51	9
carleneg	06:28:55	10!
carleneg	06:29:15	ready or not here i come
erickam	06:30:49	where are you gameruler
elijahw	06:31:54	gameruler where u at
gameruler	06:32:13	were are you
erickam	06:32:33	I just came from the pyrimid
carleneg	06:33:40	you think you slick gameruler you in this box
carleneg	06:34:49	get ut of here
gameruler	06:35:01	no
carleneg	06:35:29	get out ur it
erickam	06:35:30	Gameruler she is right there
gameruler	06:35:38	i kow
elijahw	06:35:41	get in this box
erickam	06:35:42	Do not come out

(Conversation continues. The entire conversation can be found in Appendix H.)

Informal feedback from two male youth support this enjoyment of this type of game, as their response to the question, “What kind of games do you think their should be in Zora” was *“Like racing games or something”* and *“mmm......like game finding each other…someone disappear and we have to search for him and catch him.”* Calvert et al. (2003) found similar results in terms of play modes for preadolescents in virtual worlds, stating:

> In our study, boys were more playful, both in the role-playing activities that they assumed, as well as in the propensity for making up games, such as hide-and-seek, peek-a-boo, copy cat, and I’m taller than you, that took advantage of their online setting. (p. 641)

From the ClubZora project, then, it is clear that open-ended role playing games are enjoyed by participants. Furthermore, giving participants the opportunity and tools to create their own games within the virtual world can be a powerful means by which youth can participate in age-appropriate play.

Attribute 5: Artifacts

One of the most prominent features of the ClubZora world was the number of objects—over 52,000—that were created by users. As described in Chapter 3, participants could create several types of objects in Zora, including customizable cubes (called *artifacts* in Zora), characters, decorations, message boards, movie screens, music objects, picture frames, and signs. Figure 18 shows the numbers of each object that were created over the course of the project by all participants (youth and Coordinators/Mentors), per the evaluation question: *What types of artifacts are users creating?* Figure 19 shows how objects were created and deleted over the duration of the project. Figures 20 through 23 highlight some examples of artifacts created by youth in ClubZora.

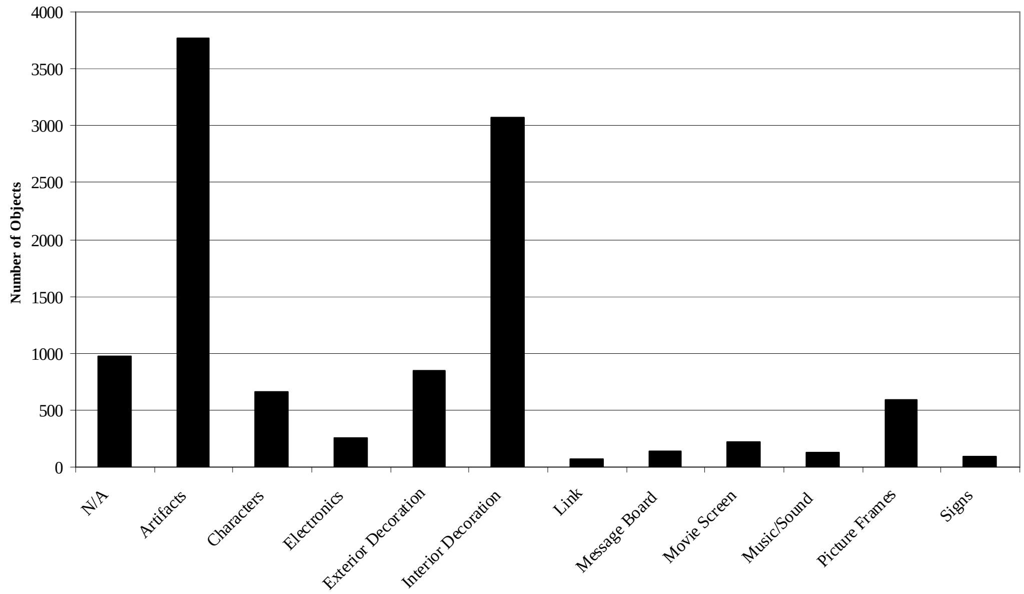


Figure 18. Types of objects created by all participants (youth, Coordinators/Mentors, and project administrators) during the ClubZora project.

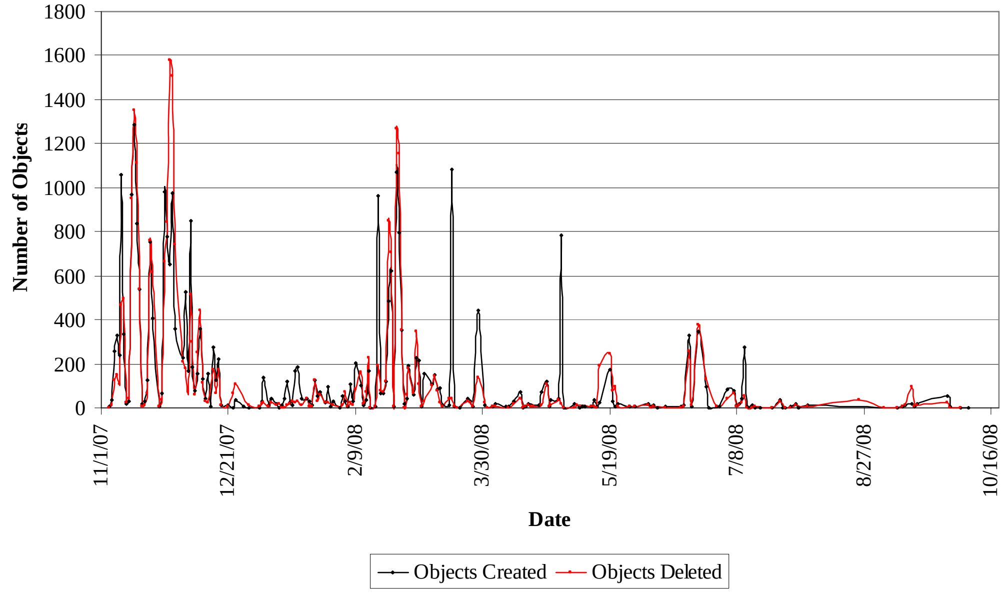


Figure 19. Object creation and deletion in ClubZora by all participants (youth, Coordinators/Mentors, and project administrators) over the duration of the project.

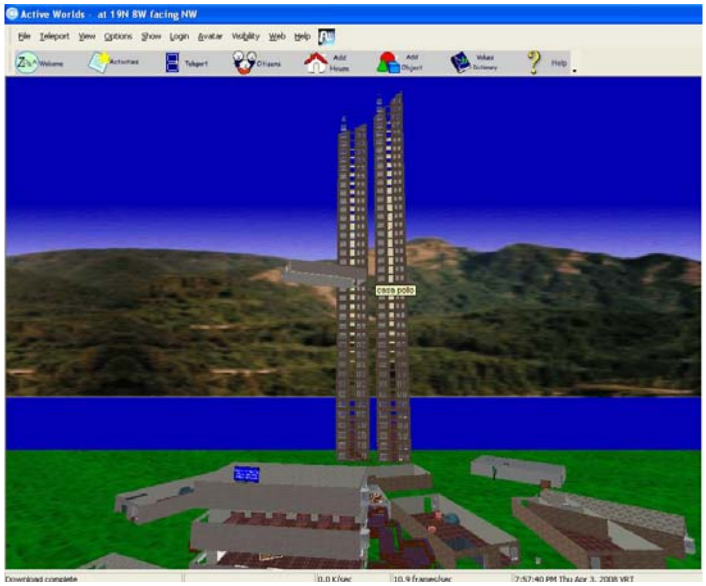


Figure 20. Clubhouse towers created by a youth member from a Clubhouse in Latin America.

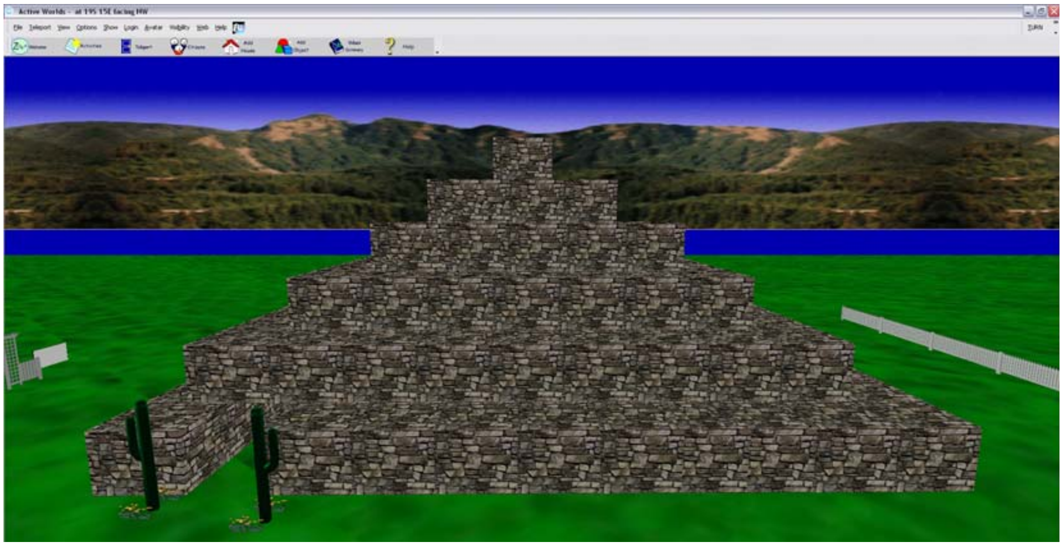


Figure 21. Pyramid created by a youth member from a Clubhouse in Latin America.

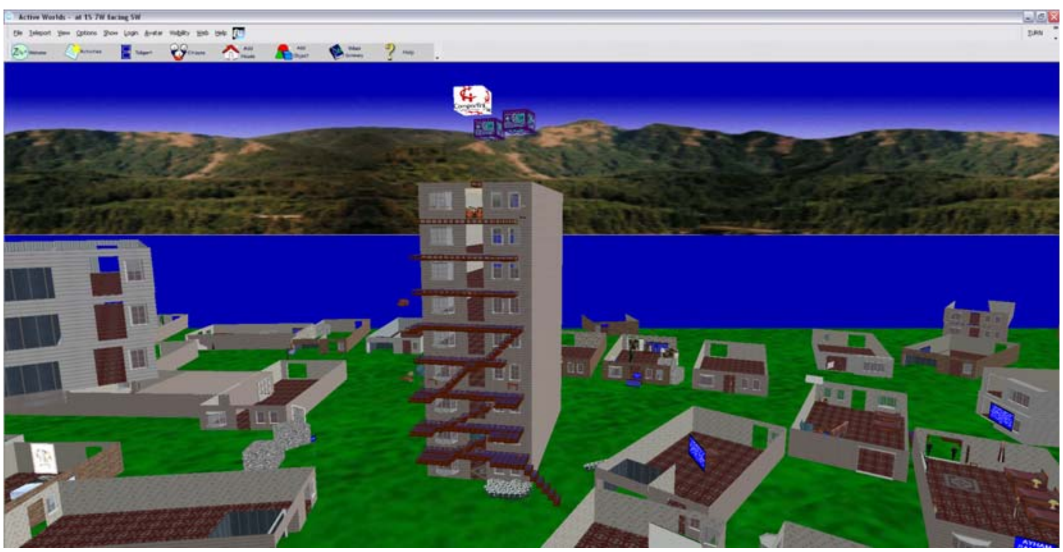


Figure 22. Clubhouse representation by a Mentor/Coordinator in Latin America.

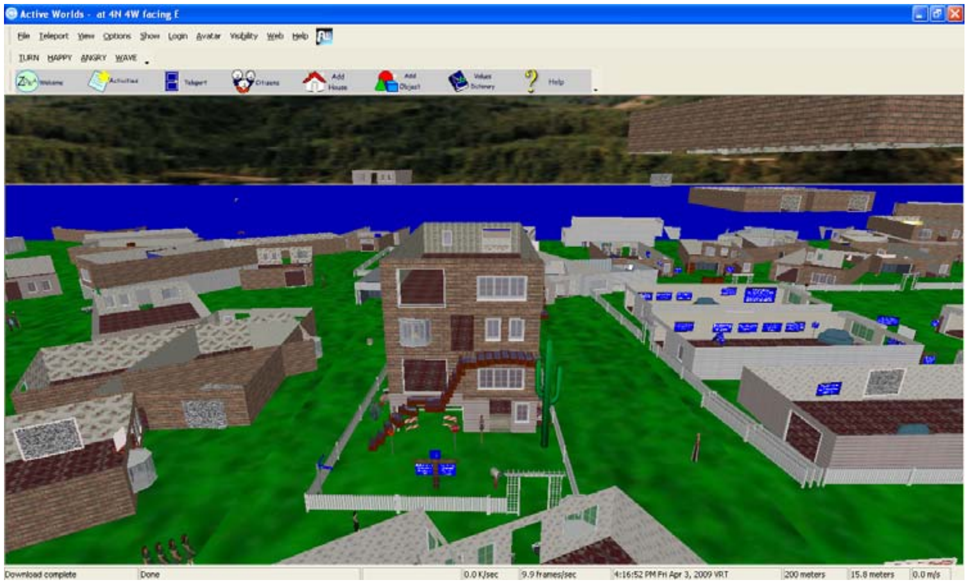


Figure 23. Personal house created by a youth member.

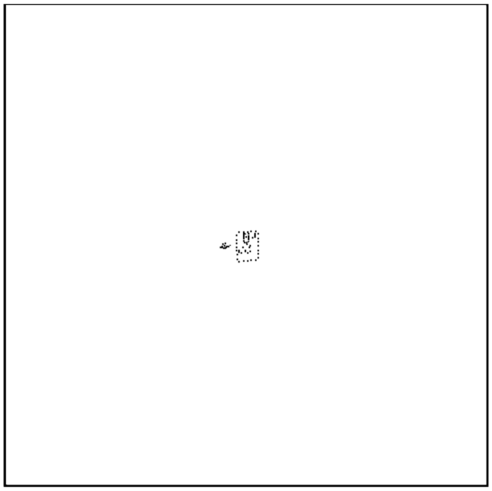
Of the objects that were recorded, customizable cubes and interior decorations were the most commonly used objects (Figure 18). Objects that were expected to be the most used by the Clubhouse were electronics (a computer and a TV, both of which could have their screens customized to show a picture), movie screens (which could play movie files via a URL), music speakers (which could play an .mp3 file via a URL), and picture frames (which could display an image file via a URL). As originally conceived, this project was partially intended to provide a place for Clubhouse members to showcase the work they completed in their Clubhouse in an interactive manner. However, as one user wrote via informal feedback: "*It was often quite discouraging for members to have to go to the village, upload their project and then go back to zora and find out it won't work*." Another user wrote, in response to what they liked least about Zora: "*Project upload limits. We had issues showing flash .avi projects, in the beginning we didn't know that you can only have a project 100kb or smaller*" and

“Having to upload as a two stage process - first onto the village and second onto zora. Members often loose interest in the first technical glitch and to add a project from their folder onto Zora took a long time and was frustrating when it didn't work.”

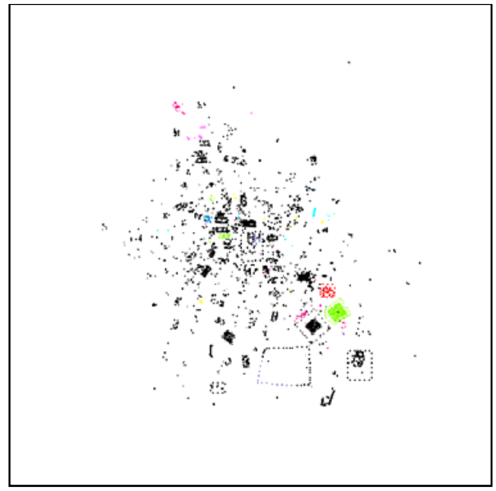
Due to server space limitations, the research team could not host the image, video, or music files that users may have wanted to add to their objects; as a solution, the research team modified the object properties so that they could display the contents of a URL link. Therefore, members could upload projects to *The Village* then use that link as a means of displaying their project in Zora. This was also done to increase the connection between Zora and *The Village*—by having users first place their projects in *The Village*, the research team hoped that their relationship with *The Village* and the Clubhouse Network as a whole would be reinforced by the Zora software. However, feedback and usage suggests that this may have created an additional barrier to the use of these types of objects, especially since many projects created by Clubhouse members may have had too large of a file size for display in Zora. Ideally, future projects should attempt to have a more seamless integration of multimedia, though it is recognized that the Clubhouse Network is a unique organization in its use of multimedia projects and therefore this suggestion may not be applicable to other organizations.

In reflecting upon the evaluation question: *Do users find the objects that are available to them acceptable?,* ClubZora participants were given a limited set of 35 objects with which to work. This limitation was added purposely by project designers for two reasons, one pedagogical and the other technical. First, the project designers wanted users to use their imaginations as much as possible to create personally meaningful objects, including personal houses and public spaces. Thus this limited object set included several objects that could be customized with pictures, video, or sounds. So, for example, a cube could have a picture of stones mapped onto it; many cubes together created a stone pyramid. The picture frame object could display art that the user had created in their Clubhouse; several picture frames on the walls of a house turned it into an art gallery. Users also used the objects they had in unconventional ways; for example, the many coffee-table objects staggered on top of each other became stairs. Unfortunately, however, a limitation of the Active Worlds platform customization, as manifested in Zora, is that users, if they learned how to “hack” the properties for objects, could easily access the entire AW library of thousands of objects. Therefore, while the project team only officially supplied the 35 base objects, several members of the Clubhouse Network quickly (within the first three days of program launch) figured out how to work around this limitation. While this certainly resulted in a world full of interesting “non-sanctioned” items, it meant that they were not tied to our web-based component and therefore not part of our database. However, on the “plus side,” this was one of the most interesting aspects of the projects—the youth participants were able to explore the unplanned corners of the virtual world in order to create new possibilities for play and the creation of spaces for which the administrators had not originally accounted.

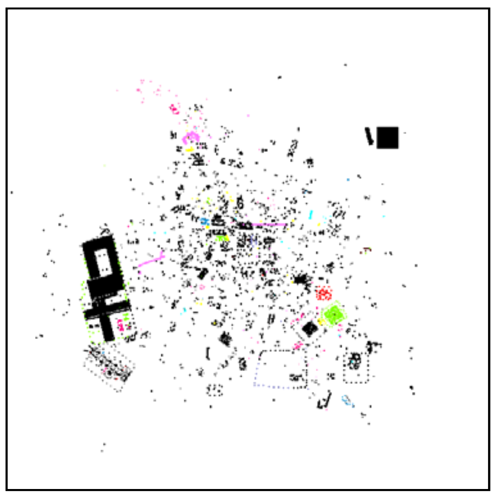
This enormous number of objects in the ClubZora project, however, was a bit of a “double-edged sword”—on the one hand, it was exciting to have users who were so interested in the project that they created many artifacts. On the one hand, the sheer volume of objects, and the unorganized manner in which they were added to the world, made it very difficult, if not impossible, to navigate easily (as partially described in the purpose section). To illustrate the growth of the world, Figure 24 shows three “birds-eye view” maps; this is one means of examining the evaluation questions: *How are the artifacts distributed in the world?* The first map is from before the project started; the only objects in the world are those that a project administrator added to pre-populate the world. These objects included an English-language Welcome House, a Spanish-language Welcome House, a Zora City Hall, an Activities House, and a personal house of the administrator. The public houses were surrounded by a fence in order to indicate to users that this was an area that was reserved for the City Center and that personal houses were not to be built in this area. The second map shows the world one month into the project and the third map shows the world during the last month of the project.



November 2007



December 2007



September 2008

Figure 24. Birds-eye-view maps showing the growth of the ClubZora virtual world, November 1, 2007 to October 1, 2008.

As described in the attribute of purpose, the purpose of the ClubZora project may not have been clear to participants, as reflected in the decrease in enrollment over time. I hypothesize that this lack of understanding is partially because participants did not know “what to do” in Zora once they entered the world, and hence did not have a clear understanding of the purpose of the project (as described in attribute of purpose above). I believe this is in turn due to two reasons, both having to do with the world artifacts: (1) limitations of object permissions, and (2) lack of world structure stemming from a minimally pre-populated world.

The first reason (corresponding to the evaluation question: *Are the object permissions as determined at the start of the program continuing to be acceptable as the program runs?)* was that object permissions were set so that members could put objects “on” other objects, even those that they did not create. The project administrators set the permissions this way in order to allow collaborative building of houses and objects (the converse of this option would not allow members to work together), one of the main purposes of this project. However, users would often build objects on top of other users’ objects, sometimes on purpose but often times not. Only the creator of the object, or the project administrator, had the ability to move objects; users may not have known how to contact the other user or the project administrator to remedy the situation. This resulted in a “messy” and chaotic world—upon entering the ClubZora world, a user would have difficulty getting to a particular location and finding a free space in which to build their own structures (Figure 25). Some users even used this ability to be destructive—in one afternoon (November 26, 2007) one user (a 13-year-old male from a Clubhouse in CA) created over 700 character objects in an army-like configuration (i.e., marching two-by-two) that went through the houses and spaces of many other users (Figure 26). Fortunately, I was online at the time and was able to work with him to remedy the situation, as reflected in the conversation shown in Table 21.

Figure 25. Screenshot of the Zora world showing the lack of free space.

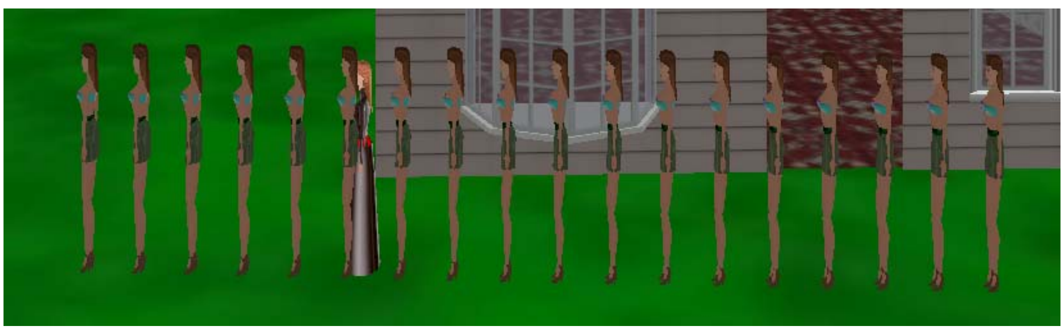


Figure 26. Screenshot showing an example of an “army” of characters.

Table 21

Chat Conversation in ClubZora between the Project Administrator (Laura) and a 13-Year-Old Male Participant Regarding Creating Objects over the Buildings of Other Participants.

Name	Time	Message
salter98	06:35:15	what happened *[Note: The user was pretending he did not know where the objects came from.]*
Laura	06:35:26	what do you mean?\
salter98	06:35:44	those things
Laura	06:36:21	salter98--i am going to need you to delete those
Laura	06:36:37	i appreciate the effort but they can't be in this space
salter98	06:37:51	my master piece
Laura	06:38:16	salter--you are going to need to remove many of those
Laura	06:38:28	it isn't really appropriate
apicer98	06:38:42	k
Laura	06:38:57	you can keep some of them but they cannot be in someone's house
Laura	06:39:30	and they can't get in the way of the world too much.
Laura	06:41:28	salter--you added over 700 of those characters
Laura	06:41:37	i might have to delete all of them
salter98	06:41:39	wow
salter98	06:41:58	im deleting them!
Laura	06:42:16	what about you making a masterpiece somewhere else where people can come visit?
Laura	06:42:24	i see them going away. thank you. :)
salter98	06:43:33	can you help?
Laura	06:43:57	will delete the ones in city center
Laura	06:44:03	since it is most important that those aren't there
salter98	06:44:09	i alraedy did
Laura	06:44:23	i really like that you were being so creative it is just that you are on a lot of people
Laura	06:44:30	s property!
Laura	06:44:41	i think you could make something really cool though for people to visit!
Laura	06:45:59	try holding crtl when you select one

Name	Time	Message
Laura	06:45:59	it should select multiple
salter98	06:46:55	you can delet em to
salter98	06:47:47	is that all
Laura	06:48:13	looks good

One Clubhouse in Latin America, with many active members, attempted to create an organized village on the outskirts of the world in an unpopulated area. This village contained roads, houses, flower beds, and a fence around the perimeter signaling the boundaries of the village. At the entrance to this village they put signs in Spanish and English asking other users to respect the space (Figure 27).

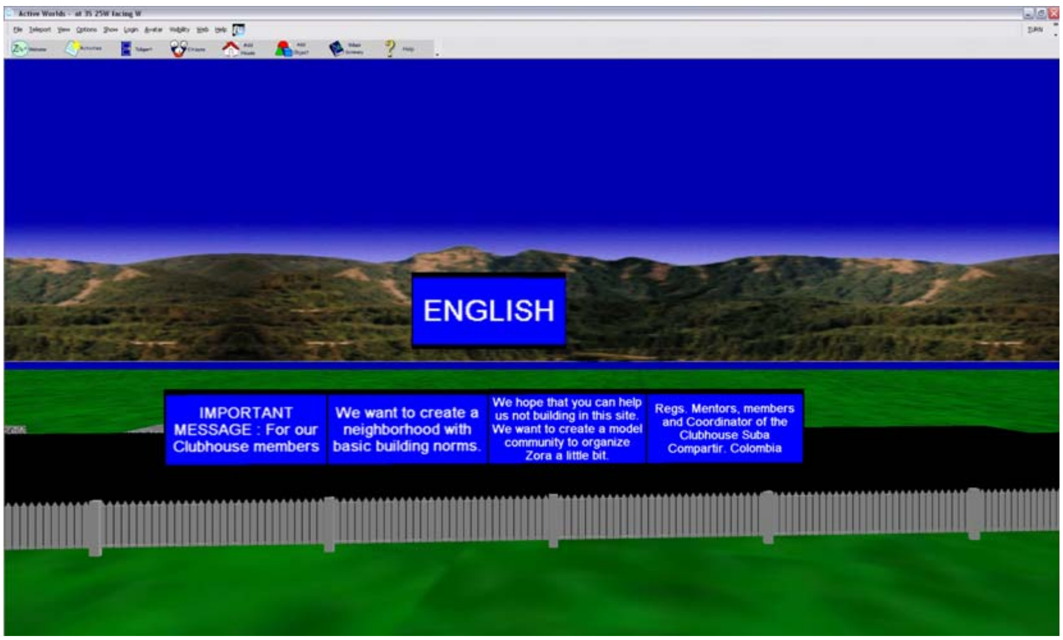


Figure 27. Screenshot of an attempt to create a “clean” space, created by members of a Clubhouse in Latin America.

This inability to move objects owned by another user was really frustrating to users who had spent time building a space within Zora, only to find that someone else had added unauthorized objects to the area. Informal feedback from users supported this, with participants responding about what they did not like about Zora: *"houses being built over [other] houses," "not being able to delete things that people built in my house,"* and *"Ugh... Having to clean up after others...."* In an ideal case, there would be mediation between the two users with the help of the project coordinator, allowing the two users to work together to fix the situation. Taking it one step further, ideally the project administrator would then work with all participants to create a method for dealing with this situation that was publically posted and agreed upon by all participants. However, as it was often difficult to get users online at the same time, especially if they were located in different regions of the world, this was a challenging task that most often resulted in the project coordinator moving objects at the request of a user. Unfortunately, this challenge has no drawback-free solution, at least within the Active Worlds platform—if the object permissions are modified so that users cannot build objects where someone else has an object, it eliminates the possibility of collaborative work. Therefore, perhaps the best solution would be increased education, monitoring, and support from the project administrators as well as stronger reinforcement of internal Zora policies regarding where buildings and objects could be placed in order to reduce overlapping buildings and objects.

Another reason that a minimally pre-populated world was not successful with a large population of users was that the world might have become too large and too cluttered for new users, making them feel overwhelmed upon entrance to the world. Even experienced users may have been unsure of how to proceed over time in such a large and unstructured world. As there was little sense to the layout of the world, with the users often haphazardly placing objects and houses, it was difficult to find objects and other people who were online. Informal feedback supported this notion, with the following responses pertaining to the purpose of the project and what was liked the least about the project: "*no map, getting lost,*" "*It was hard to find a piece of land to build [a] house*," "*It seems like there were no land left,*" "*It seemed like a 3-D extension of the Village, but it never really seemed to get there - it seemed like a lot of people building houses on top of each other,"* and "*The confusion about finding other Clubhouse members' houses."* Though mapping software is available from several third-party sources, in which the prop dump files can be used to create a birds-eye view map of the world, these maps are static and do not reflect the dynamic and constantly changing nature of the ClubZora world.

In an ideal situation, the Zora software would have a map that was updated dynamically to allow members to better understand the layout of the world and navigate it more easily. For future projects, it would be suggested that the world, if possible, be pre-populated with additional city-planning features, such as roads, street signs, and landmarks. Depending on the specifics of the population and the goals of the project, this process could also be implemented during the first few group activities to encourage community involvement. Of course, this suggestion also comes with the need to increase education regarding where objects and houses can be built and methods for working together when objects are not placed correctly. This would possibly allow for a less chaotic world that would be easier to navigate. Perhaps these measures would make it less overwhelming for new users to know “what do to” as well as allow them to easily find open land in which to build their own creations.

Finally, when opening the Zora software over the course of the project, users may have become frustrated with how slowly the software ran due to the enormous number of objects in the world, and therefore, in combination with the other factors described above, may have abandoned the project. Unfortunately, this may be a difficult challenge to improve upon for future projects, as it would be difficult to completely control the computers being used and the Internet connection available. Perhaps, then, additional education regarding some of the Active Worlds program settings (i.e., reducing the number of objects that can be seen at any given time) would help improve program performance.

Attribute 6: Policies

The document *ClubZora Code of Conduct* (see Appendix C) reflected the policies of the ClubZora project. *ClubZora Code of Conduct* states that the *Computer Clubhouse Code of Conduct* is in effect at all times; the *Computer Clubhouse Code of Conduct* in turn refers to the *Computer Clubhouse Internet Safety Guidelines*, the *Computer Clubhouse Software Policy*, and the *Computer Clubhouse Copyright Policy*. Due to the nature of the ClubZora project within the Computer Clubhouse organization, it was extremely important that the policies of the host organization be incorporated into the project policies. As mentioned previously, participants had to agree to the *ClubZora Code of Conduct* as part of their request for enrollment into the program. In addition, the project administration, prior to the start of the project, had created a Town Hall in the City center. One of the objects in the Town Hall was a message board containing the text of the *Code of Conduct*. Youth were encouraged to leave a message if they had any questions or wanted to make any updates to the Zora Code of Conduct.

In order to monitor and enforce these policies, *Zora Ambassadors* were used, as reflected in the evaluation question: *How is monitoring of the program policies occurring?* These Zora Ambassadors were high school, undergraduate, and graduate students who were committed to being online for specified times during the week and who also read the chat logs on a regular basis. While their primary focus was actually to work with youth participants in the world, they also served an important function in terms of policies. Zora Ambassadors were given an *Online Mentor Guide* prior to the beginning of their mentorship. This document contained information about what was expected of them as mentors as well as "FAQs" for working in the project. Some key excerpts, related to policies, are below:

> While the above tasks are ideally the focus on your work, part of being an online mentor is monitoring for the safety of members. This includes monitoring for inappropriate language, bullying, aggressiveness, etc. All members, when they request a username and password to access Zora

must agree to abide by the Code of Conduct [Code of Conduct was provided].

FAQ 4. A youth uses inappropriate language or two youth are "fighting" in Zora.

Sometimes the youth do not realize what we consider to be inappropriate language—they use abbreviations, symbols, etc. to get around actually using a profanity. No form of profanity is allowed. If you see this in the chat, first give them a first warning, referring to the Code of Conduct they signed. Usually this first warning is sufficient. If it continues, however, please send me an email or call my personal cell phone at 999-999-9999. Since I am the "ruler of the universe," I have the power to eject people from Zora for a period of time to "cool off" (though this is a last resort). If I am able, I will come online and help mediate the problem. Regardless, please include this situation in your field notes report and I will be sure to follow up with the youth and his/her Coordinator.

Inappropriate language can also be the connotation of their language—I had a youth not realize that I was the Coordinator of ClubZora and ask "How you doing, sexy lady?" I reminded him that I was a Coordinator and that type of language was inappropriate for Zora.

Youth might also "fight" in Zora—often this is two youth who are sitting next to each other in the same Clubhouse. You might feel powerless in this situation, but start by giving a warning. If this doesn't work, contact me. If it involves me calling the Clubhouse at that moment, I will do so.

At the conclusion of each online mentoring session, Zora Ambassadors were required to complete field notes, using a template provided, in which they were to document any misbehavior, though they were also asked to email the project administrator immediately as well. Table 22 and Table 23 are two chat excerpts that reflect situations in which an adult mentor had to reinforce the ClubZora policies.

Table 22

Chat on December 3, 2007, between Project Administrator (Laura) and Several Youth Participants, during which the Project Administrator Reminded the Youth of the ClubZora Policies.

Name	**Time**	**Message**
meaker1	05:23:48	ur mom
doekid5	05:26:10	hi
tmoores	05:29:26	hi matt
job96	05:30:03	hello people!
meaker1	05:30:12	hi lozer
job96	05:31:40	meaker1 come and say it right here but face
Laura	05:31:59	hey--watch it guys
job96	05:32:55	laura a person named meaker1 said a bad word.
Laura	05:34:19	i saw...thank you for telling me though
meaker1	05:34:26	was up
job96	05:34:55	meaker1 don't talk to me i hate you
Laura	05:35:07	time out with a capital T
Laura	05:35:12	everyone...deep breath

Name	Time	Message
Laura	05:35:23	Zora is not a place where people talk to each other like this
meaker1	05:35:25	hi
tmoores	05:35:42	no thanks im perfectly calm
Laura	05:37:16	everyone needs to remember that the same rules of the Village chat are in Zora.

Table 23

Chat on March 13, 2008, between a Zora Ambassador (Mark) and a Youth Participant (doekid5), during which the Zora Ambassador Reminded the Youth of the ClubZora Policies.

Name	Time	Message
doekid5	06:46:34	Oh yeah and I'll tell ya how to phase through stuff if you tell me your password!
doekid5	06:46:38	Deal?
doekid5	06:46:43	1254257
doekid5	06:46:44	adkln
doekid5	06:46:46	heh?
doekid5	06:46:48	sorry!
doekid5	06:46:58	now tell me your password!
doekid5	06:47:01	FRIEND!
doekid5	06:47:06	PLZ
doekid5	06:47:11	I can't do anything!
Mark	06:47:12	i cna't tell my password it is aginst the rules
doekid5	06:47:23	WHo cares do you work for Laura?
doekid5	06:47:26	Hm..?
doekid5	06:47:34	Do ya!
doekid5	06:47:48	hello?
Mark	06:47:50	do you work for laura
doekid5	06:47:53	NO way!~
doekid5	06:47:56	Do you@
doekid5	06:47:59	you!
Mark	06:48:07	well what do you think

Name	Time	Message
doekid5	06:48:07	Do ya!
doekid5	06:48:11	I dunno?
doekid5	06:48:16	No I guess?
Mark	06:48:27	then lets leave it at that
doekid5	06:48:29	Tell me your password and I'll tell ya mine!
doekid5	06:48:39	Hurry I'm leavin
doekid5	06:48:41	soon!
Mark	06:48:42	i can't go against the ruels
doekid5	06:48:53	why not nothing will happen!
doekid5	06:48:56	Do IT
Mark	06:49:08	but what if it does
doekid5	06:49:12	that's it I've had enpugh of you
doekid5	06:49:17	enough of you
doekid5	06:49:32	I'm gonn cube you again!
doekid5	06:49:34	DIIEEE
Mark	06:49:35	do you want to show me your house
doekid5	06:49:42	you better run!
doekid5	06:49:48	Your going down
Mark	06:50:01	i am sorry lets be friends
doekid5	06:50:10	Tell me your password first!
doekid5	06:50:17	Or elseI'll cube you!
doekid5	06:50:24	5
doekid5	06:50:26	4
doekid5	06:50:29	3
Mark	06:50:31	it is against the rules
doekid5	06:50:32	2
doekid5	06:50:35	1
doekid5	06:50:37	0
doekid5	06:50:41	1/2
doekid5	06:50:46	1/4
doekid5	06:50:48	1/5
doekid5	06:50:51	0
doekid5	06:50:52	die
doekid5	06:51:11	Why aren't you running?

Name	Time	Message
doekid5	06:51:21	Just die
Mark	06:51:32	cause we are friends
doekid5	06:51:40	I'm loggin' out
doekid5	06:51:52	DIE

For the duration of the project, the project administrator emailed nine participants (with a carbon-copy to their Clubhouse Coordinators) regarding policy breaches; none of these participants had to be emailed again. In addition, the project coordinator had to threaten temporary ejection from the world only once; the participant, however, altered his behavior so that ejection was not necessary (Table 24).

Table 24

Chat on April 24, 2008, between the Project Administrator (Laura) and Two Youth Participants, during which the Project Administrator Reminded One of the Youth the ClubZora Policies or Else Face Ejection from the World.

Name	Time	Message
tmoores	04:44:59	Laura can you delete Matt's house now he is messing up the fourth floor
tmoores	04:45:30	Laura please
Laura	04:45:40	i don't even see it
Laura	04:45:42	one sec
tmoores	04:45:45	Matt you idiot
tmoores	04:46:01	stop
Laura	04:46:06	do you mean the cubes?
tmoores	04:46:16	yes and his home
tmoores	04:48:17	Laura their back and kick matt out for adding the cubes
Laura	04:48:17	sam

Name	Time	Message
doekid5	04:48:18	Matt you ******* ***** ******** ***** *** *** *** *** *** ***!
tmoores	04:48:42	Please matt stop it
Laura	04:49:01	hey
Laura	04:49:03	guys...time out
Laura	04:49:07	what the heck is going on
Laura	04:49:35	matt--i see the cubes gone and no house
Laura	04:49:38	is everythin gall set now?
tmoores	04:50:02	he is adding cubes in my house because He thinks that I added stuff in his home which I did not!
Laura	04:51:45	i don't see any cubes right now
Laura	04:51:48	are they gone?
tmoores	04:52:18	Laura He is duplicating my love seat stop him
tmoores	04:53:00	please matt your being very rude Laura can you delete his stuff i'm sick of him
Laura	04:53:05	yes.
Laura	04:53:18	matt. before i eject you from zora i am going to giv eyou one last chance
Laura	04:53:32	please remove the objects that you have created in sam's house
Laura	04:53:35	and stop pestering her
doekid5	04:53:38	never!
doekid5	04:53:42	No!
doekid5	04:53:47	Mwsa ha ha hah a ha!
doekid5	04:53:52	Mwa ha ha ha ha ha ha!
tmoores	04:53:52	Goodbye matt
tmoores	04:53:55	forever
doekid5	04:53:57	Take that!
Laura	04:54:05	matt--you really want to be ejected?
tmoores	04:54:16	Yes it seems like he does
tmoores	04:54:38	he nodded to me
doekid5	04:54:42	no!
Laura	04:54:46	ok
tmoores	04:54:51	thatmeans yes I believe
Laura	04:54:55	i see that you have cleaned up the mess you created
doekid5	04:55:05	Somebody just came on my account and duplicated this studff in Samantha's house!
Laura	04:55:06	matt--did he remove everything you wanted?

Name	Time	Message
Laura	04:55:11	i doubt that.
doekid5	04:55:12	It wasn't me!
doekid5	04:55:21	I'm positive!
tmoores	04:55:28	Yes it was liar matt as usally
tmoores	04:55:38	yes
doekid5	04:55:45	Samantha was gone at the moment she didn't see it@
doekid5	04:55:49	Seriously!
Laura	04:55:57	suuuuuure it was
doekid5	04:56:54	It wan't me promise!
doekid5	04:57:05	I know that I would never do stuff like that!
tmoores	04:57:19	Laura there is still a cube in my first floor can you delete please
doekid5	04:57:19	Please forgive me for what that evil person had done!
Laura	04:57:25	well...please tell your...err..friend that was not at all appreciated
Laura	04:57:34	but i am glad that this time i did not have to eject you

Policies in the virtual world program can be difficult to monitor and enforce. Therefore, it is important that designers have a clear plan of action for creating, distributing, and enforcing the program policies.

Attribute 7: Mentorship

There were two types of mentors for this project (called *Zora Ambassadors*): Ambassadors who went to the local Clubhouses and met the youth face-to-face and online Ambassadors who worked with the Clubhouse members virtually through Zora only. Ambassadors to the local Clubhouses were undergraduate and graduate students who visited once a week to help install Zora, teach members how to use the software, and encourage them to use Zora. At the end of each session, they submitted field notes, based on a template, to the project coordinator.

The online ambassadors for this project, who worked from January 2008 until April 2008, were bilingual (Spanish and English) and were assigned one afternoon each to be online for approximately three hours at a time. They were comprised of undergraduate students, an alumna of the DevTech Research Group, and a high school student doing community service credit in Miami who was associated with the project director. The primary task of the online ambassadors was to interact and get to know the youth. They were to facilitate communication amongst the youth about topics that the project administration deemed important—for this particular project, these topics included culture (getting to know about each other), values, and identity. They were also to encourage the youth to complete the activities and feedback surveys.

In addition, the project administration encouraged the online ambassadors to work with “their” group of youth (i.e., those who were on Zora their scheduled day) to plan projects within Zora or to come up with new ideas harnessing the youth’s interests (e.g., making a movie of Zora, building a new community structure, coming up with a survey for everyone to take, or writing a newspaper). While the above tasks were the focus of their work, part of being an online mentor was monitoring for the safety of members. This included monitoring for inappropriate language, bullying, aggressiveness, and violations of the Zora Code of Conduct, which all members had to agree to before enrolling in the project. At the conclusion of each session, mentors were required to submit a set of field notes, also based on a template, to the project coordinator.

The attribute of mentorship is very closely intertwined with the other attributes, especially for this project. In ClubZora, the adult mentors were key figures in ensuring that the *purpose* of the project was known to participants; encouraging, facilitating, and supervising *communication*; supporting and championing youth *participation* in the project; promoting, assisting, and engaging in *play* alongside the youth; supporting and providing aid in the creation of *artifacts*; and monitoring, enforcing, and facilitating development of the *policies* of the virtual world.

This chapter presented a case study approach to the evaluation of the implementation of the ClubZora project. In this chapter, I have examined each of the seven attributes as applied to the ClubZora project. This application of the attribute framework to the ClubZora project illustrated how the attributes can be used in the design and evaluation of an actual virtual world program. In addition, I described both successes and failures that occurred during the project, while providing suggestions for future projects. In the next chapter, I will discuss the limitations of this study, future work, and concluding thoughts.

Chapter 8: Limitations, Future Work, and Conclusions

Limitations

As this dissertation attempts to integrate a variety of fields to better develop virtual world programs for youth, there are several areas in which limitations exist. These areas correspond to limitations of design-based research, the case study approach, the ClubZora study, and the attribute framework. The natural extensions of these limitations are areas of future work; therefore, I will address corresponding future directions within this section. I will provide separate, additional suggestions for future work in the next section.

Limitations of design-based research. The development of the attribute framework—the results of the study—was done using a design-based research approach. However, this method is not without its limitations, both as an approach in itself (see Dede, 2004, 2005) and when used in the context of this study. In the latter, as Dede (2004) writes:

> DBR studies generate an unmanageable (and almost unstorable) amount of data. The investigators appropriately worried about selection bias in choosing which cases to highlight and about Hawthorne effects potentially introduced by their unavoidably obtrusive presence in implementing evolving design interventions and in collecting massive mixed-methods data. (p. 107)

This limitation is true here as well—an enormous amount of data was collected during the ClubZora project. Therefore, the pieces of data that I selected to focus on, and, perhaps more importantly, those that I did not select, are subject to bias.

A limitation resulting from focusing on innovation within a local context is that the innovation may not be generalizable to other contents (Barab & Squire, 2004). Barab and Squire (2004) stated:

> Ignoring or limiting the fundamental role of context will lead to both impoverished designs as well as under-specified theories that lack generalizable power. As such, much of the design-based research results in boutique projects that have little impact beyond the researcher's vita. As a community we must work to conceptualize and inquire about the material, social, and cultural contexts through which our work takes on meaning. (p. 12)

However, while I developed this attribute framework based on my experiences with two programs—VCLC and ClubZora—and this dissertation study focused on virtual world programs for preadolescents, I believe that this framework could be applicable to other ages as well, such as preschoolers and teenagers (see Beals & Bers, 2009).

Limitations of the case study approach. Though I proposed that a hybrid evaluation approach be used to evaluate virtual world programs, the main one suggested is a case study approach. The case study approach does have several important limitations that should be noted. According to Stufflebeam (2001), "the main limitation of the case study is that some evaluators may mistake its openness and lack of controls as an excuse for approaching it haphazardly and bypassing steps to ensure that findings and interpretations possess rigor as well as relevance" (p. 35 – 36). Therefore, when using a case study approach, evaluators need to have clear evaluation questions and employ reputable and rigorous methods to analyze their evaluation questions.

Limitations of the ClubZora study.[52] The first limitation of the ClubZora study relates to the fact that I was the researcher, the project administrator, and a participant in the project. While fulfilling these three roles simultaneously allowed for a unique perspective on the project, and subsequently these experiences informed the creation of the attribute framework, the study is subject to limitations surrounding participant observation and researcher bias.

Second, due to the virtual and electronic nature of this project, I am only able to make suggestions and inferences based on the data available and my experiences as the coordinator of the project. Due to IRB limitations, I was unable to connect the "Zora person" to the "real-life person," and therefore I was unable to associate a user's activities in the Clubhouse with his/her experience in Zora. In future studies, however, it would be important to be able to gather more real-life information about participants and be able to connect them to their virtual person. This could perhaps be done with a separate study, having its own methodology and consent process, with the members of a local Clubhouse (or organization location). In particular, information about participants' use of the program, in relation to other activities, would give a better sense of the project implementation and how it could be improved for the future.

[52] Parts of this section have been adapted from the previously published manuscript Beals, L., & Bers, M. (2010, May). Evaluating Participation in an International Bilingual Virtual World Educational Intervention for Youth *Journal of Virtual Worlds Research, 2*(5).

Third, while data were available regarding participants who enrolled in the project but did not participate, there were not data regarding those members of the Clubhouse who did not enroll in the project. Therefore, the data gathered were on a small, and in some ways self-selected group of participants, subset of Clubhouse members. There may be important reasons why members did not enroll in the project; these reasons may have important design implications beyond what has been described in this work. Future studies such as this, in which the program is open to a particular organization but voluntary in nature, should attempt to connect with organization members who had the opportunity to engage with the program but did not, perhaps through the use of interviews, questionnaires, or focus groups. This should occur at several points during the program, and especially at the beginning, in order to rectify issues deterring participation.

Fourth, as there are some challenges and limitations in what the software can record, I may have an incomplete picture of what "really" happened in the project. Therefore, my findings and conclusions can only be based on the available data. Perhaps for future projects, I would increase the number of "bots" (background programs that run as part of the Zora software) that record information about how participants use Zora; in particular, understanding their movements within the program over time may be important. This would, for example, allow researchers to see where participants were congregating in the world (e.g., were participants engaging in group chat at a particular location or whilst in different areas of the world? How does virtual communication compare to face-to-face communication styles?) and how the flow of traffic within the world reflected larger program goals (e.g., were participants spending more time visiting each other's personal spaces rather than the program activity spaces?). Finally, much of the demographic information that was used came from user-reported data, and therefore the accuracy of it is unknown.

Fifth, this was a unique intervention that was piloted with an organization that has its own mission, principles, and methods of practice. Therefore, while many aspects of the implementation, and in particular suggested implications for future projects, could be applicable to other programs of a similar nature, some aspects were specific to this particular project. Because it was a pilot intervention with a specific population, the results may not be applicable to other populations.

Limitations of the attribute framework. The attribute framework presented in this dissertation provides the foundation for understanding how to design and evaluate virtual world programs. However, limitations of this framework do exist. First, there may be more attributes. I originally did not include mentorship as an attribute (as reflected in Beals & Bers, 2009), and only added it after my experience with the ClubZora project. Therefore, further experiences with virtual world program may result in the identification of additional attributes.

Second, while I believe the framework in general is applicable to virtual worlds for children of all ages, this study only focused on preadolescents. Future examination of these types of programs should include an examination of virtual world programs for young children (preschoolers and kindergarteners), school-age children, and teenagers. In addition, I only included a small percentage of the child development research that could be pertinent; there are potentially many more additional links to the research that may be important for understanding virtual world programs.

Future Work

This dissertation, while the culmination of almost a decade of experiences in working with children and technology, has served to spark my interest in additional areas of future work. This potential future work relates both to virtual world programs and to stand-alone virtual worlds.

Future research on virtual world programs. With this dissertation as a starting point, one potential area of future work would be the creation of an applied handbook that focused on the design and evaluation of virtual world programs for four categories of children: young children, school-aged children, preadolescents ("tweens"), and adolescents ("teens"). While this dissertation includes more detail about the design and evaluation of virtual world programs for preadolescents than my previous work, it still remains at a fairly high level, as indicated by Meyers, Nathan, and Unsworth (2010): "Beals and Bers describe how developmental theory might inform the design of children's worlds, but offer only high level guidance for the creation of these spaces" (p. 6). Therefore, this handbook would provide specific detail and user-friendly guidance regarding the design and evaluation of virtual world programs.

In addition, this handbook would provide those readers unfamiliar with child development research and theories an introduction to these concepts in order that they may gain a better appreciation of children’s development and how to incorporate these concepts into their work. I feel strongly that if virtual worlds are going to be an environment in which youth are part, they should be designed in ways that support their development, and thus those doing the designing need to understand child development. I would like to also expand on the evaluation section, in particular formalizing the importance of a context/needs assessment process during the design phase of a program. In addition, I would like examine in more depth potential new methodological strategies for research in virtual worlds.

Aside from this idea of creating an applied handbook, I would like to further examine the development of communities within virtual worlds (both for youth and for adults). In particular, some questions that I have regarding this topic are: What does a community within a virtual world for youth “look like”? How are virtual communities developed within the context of a virtual world different/the same as those developed via other online-mediums? Virtual communities within virtual worlds are still a bit ambiguous to me, and I feel that understanding them, including how they are developed and how they can be supported, would be important, as the use of a virtual world for virtual communities can have exciting potential in situations in which face-to-face communities are not possible.

Finally, I would like to examine in more detail the role of communication between the user and the virtual world software, which I have not addressed in this dissertation. In many virtual world software platforms, a designer can create “bots” or characters that will interact with users. For example, in Quest Atlantis, users can click on what the designers term *hot objects* in order to get more information about an activity in the virtual world (Barab, Thomas et al., 2005). As another example, after the conclusion of the ClubZora project, members of the DevTech Research Group worked on creating an additional module to the software that allowed Zora users to create and program characters that could have a "conversation" when clicked. The potential for program designers to be able to communicate with users via the virtual world software—for example, through "bots" that would greet new users upon entrance to the world and give instructions as needed—could impact how users understand and engage in the program.

Future research on stand-alone virtual worlds. For this dissertation, I focused on virtual world *programs* as I believe that they are a new type of program that has unique considerations, and therefore I wanted to examine their design and evaluation. However, the virtual worlds that most youth today are using are stand-alone virtual worlds, a fact that should not be ignored. While some research about these stand-alone virtual worlds—which are being used by millions of youth—have been undertaken—for example, Yasmin Kafai has studied the virtual world *Whyville* extensively (Kafai et al., 2010; Kafai & Giang, 2008)—I believe that additional research into these virtual worlds is important. There are ample research opportunities that can, and probably should, be undertaken so that we can better understand these environments and children's development. I can see two perspectives for the potential research—one perspective would examine why these environments could have a positive effect on youth development. For example, potential research questions from this perspective may include:

- As youth are able to connect with other youth from around the globe, how has this changed their perspectives about being “citizens of the world”? What have they learned about the lives of other youth from this experience?
- What technological skills have the youth developed from being a part of this experience (i.e., programming, 3-D design, video creation, etc.)?
- How has participation in these environments impacted youth’s identity development? In what ways have they been able to explore aspects of their identity in ways that they would not have been able to otherwise?
- What are types of positive learning experiences youth have had that they might not have had “in real life”?

However, there is also a “flip side” to these questions—a research perspective that would examine why these types of environments could have a negative effect on child development. For example, potential research questions from this perspective may include:

- In what ways has participating in virtual worlds replaced other activities (e.g., athletic activities, face-to-face socialization with friends, school work, etc.)?

- In what ways have youth been able to access content that was not appropriate (e.g., sexual content, drug-related content, violent content, etc.)?
- What are types negative learning experiences have youth had that they might not have had "in real life"?

Both of these perspectives are important in order to provide a complete picture of virtual worlds and youth development.

In addition, I was struck by the increasingly commercial nature of these experiences. Many of the non-academic (i.e., marketing) reports referenced the potential for advertising and financial gain in virtual worlds aimed at youth. In particular, this statement concerns me greatly:

> This payment mechanic [using SMS features on cell phones] has benefits in several areas. *Firstly, many younger users are given pre-paid phones, meaning their parents are less likely to monitor their usage* [emphasis added]. The result here is that these users are more able to purchase virtual currencies/goods. Secondly, the actual process of purchasing is significantly easier with phones than credit cards - typically a five-digit code is sufficient to activate a transaction. (KZero Worldswide, 2010b, p. 3)

Calvert (2008) examines online marketing and advertising strategies targeted at youth. This line of inquiry should be continued for virtual worlds, for example, examining whether children can recognize the advertisements within the world (especially in the case of branded games). Furthermore, there should be policies and protections in place for virtual worlds, as with television and film. Of online marketing, Calvert (2008) writes:

> Regulators should also address the issue of whether and how to make the regulation of newer online marketing activities consistent with traditional television and film guidelines. Such existing television standards as clear separation of commercial from program content, rules about host selling, consideration of age-based skills in understanding marketer intent, tombstone shots of the unadorned product when the camera shot is still, and limits on the amount of time children can spend seeing marketed content should be considered in the context of newer media. Product placement, the emerging and perhaps preferred replacement of the fifteen- or thirty-second commercial, is also in need of additional study and regulation. With convergence increasingly bringing the varying forms of technologies together under one umbrella, it is sensible to have uniform standards for marketing to children across varying media platforms. (p. 224)

As a child development scholar, in particular one from the department of David Elkind, I feel this is an area that should not be overlooked.

Finally, parents should be educated about virtual world programs, so that they understand the content (i.e., what potentially could their children “get into”?) and the potential monetary implications. Perhaps a “whole world” rating scale, similar to the Infant and Toddler/Early Childhood Environment Rating Scales (ITERS/ECERS) for classrooms, would help inform both the designers of the world (i.e., using the scale as a benchmarking tool would help designers know if they were “on track” to creating a world that was appropriate and successful for children and youth) and the parents of children who want to participate in the world (i.e., this scale would help parents answer the question: “Is this a virtual world that is “good” for my child?”).

Conclusions

Virtual worlds for youth are becoming an increasingly larger part of children and youth’s online experience, with estimates that over 50% of online youth will participate in a virtual world by 2011 (Williamson, 2008b). In addition, recent reports show that the largest virtual world for adults (over age 20), IMVU, has 57 million registered users, while the largest for children, Habbo, has 175 million users, indicating just how large virtual worlds for children are in comparison to those for adults (KZero Worldswide, 2010a). Specifically, preadolescent youth are, and will continue to be, the largest users of virtuals worlds. Virtual worlds are becoming an additional environment—like school, home, and the mall—where preadolescents can learn, play, and socialize. The physical and the virtual are becoming interconnected and it is important for researchers to understand how this will affect preadolescent youth and subsequently how virtual worlds can be designed to best serve preadolescent’s developmental needs.

However, despite the enormous popularity of virtual worlds for these ages, much of the research about designing and understanding virtual worlds has been from either an adult perspective, overlooking the unique considerations required for preadolescents, or a commercial perspective, highlighting ways to encourage monetary spending. In addition, the focus is often on stand-alone virtual worlds, not those situated within programs. As organizations may want to leverage youth's immense interest in virtual worlds as a tool to support their program's goals and objectives, this dissertation focused on virtual world programs.

Designers must address the unique considerations of virtual world programs for preadolescents. In addition, program leaders should simultaneously engage in program evaluation, to better understand how their program was implemented and whether the intended outcomes of the program were achieved. Therefore, the research questions of this study were:

(1) *How should virtual world programs be designed to support the personal, social, and cognitive development of preadolescents?*

(2) How can virtual world programs for preadolescents be evaluated in order to understand both the process by which the program is implemented and the outcomes achieved by the program?

The ClubZora virtual world program provided the main context for examining these research questions. ClubZora was a unique 11-month pilot intervention aimed at bringing Zora, virtual world software, into the Computer Clubhouse Network, an international afterschool community of youth. Over 550 youth and adult Coordinators and mentors involved in this organization enrolled in the project. While interacting with the virtual world software, participants could build a virtual city, populating it with objects such as picture frames, movie screens, houses, and interior decorations. Due to its large scale, the bilingual support, and international context, this was an extremely complex virtual world program. However, these complexities informed the development of the attribute framework.

Using the methodological approaches of design-based research and program evaluation, this dissertation examined a framework comprised of seven attributes—purpose, communication, participation, play, artifacts, policies, and mentorship. This attribute framework provides the foundation for the design and evaluation of virtual world programs for preadolescent youth through a developmental lens. For each attribute, specific program design recommendations were provided and implementation and outcome evluation approaches were discussed. Virtual worlds must be considered in the context of programs in order to support preadolescent development, and the seven-attribute framework presented in this dissertation should be used in order to properly design and evaluate such virtual world programs.

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Appendix A: Examples of Virtual Worlds for Children

Name	Web Address	Description[a]	Categories[b]	Registered Accounts (millions)[c]
JumpStart Advanced Preschool World	http://shop.knowledgeadventure.com/products/jumpstart-advanced-preschool-world-premium-edition__	A PC game in which preschoolers can meet new furry friends, go on missions, play games in a 3D personalized neighborhood.	live/kids/vw/PC game	< 1
Barbie Girls	**www.barbiegirls.com**	The Barbie Girls world is designed to be a safe, fun, and exciting place for girls to play online. Once a girl has registered with the site, she can create a virtual character, design her own room, shop with B Bucks (virtual "money") she earns, play games, watch videos featuring her favorite Barbie movies and products, and have real-time chats with other registered users.	**live/kids/tweens/teens/vw**	**12**
Build-a-Bearville	www.buildabearville.com	A virtual world for kids that allows users t o bring their stuffed animals to life, play games and chat online.	live/kids/vw	< 1

Name	Web Address	Description[a]	Categories[b]	Registered Accounts (millions)[c]
Chapatiz	**www.chapatiz.com**	**Somet hing between an online game and a social network for kids with avatars and activities.**	**live/kids/vw/SocNet**	**17**
Club Penguin	**www.clubpenguin.com**	**Virtual online world owned by Di sney for children ages 6 to 14. There are cartoon penguin avatars, children can chat, play games, and play together in a snow-covered virtual world.**	**live/kids/tweens/vw**	**3**
Disney Fairies Pixie Hollow	www.pixiehollow.com	A virtual world for kids that offers Clickables, Internet-connected toys such as eBracelets that link t o online play within the Pixie Hollow.	live/kids/tweens/vw	< 1
Fusion Fall	fusionfall.com	From the Cartoon Network this is an online MMORPG designed to appeal to the kid-set.	coming/kids/MMORPG	< 1
Gaia Online	**www.gaiaonline.com**	**A virtual online world where teens can create their own avatars, play games, participate in contests, create their own virtual space and meet and make friends.**	**live/tweens/teens/vw**	**12**

Name	Web Address	Description[a]	Categories[b]	Registered Accounts (millions)[c]
Habbo	**www.habbo.com**	**A virtual world for teens with a hotel theme; there's a lobby to meet friends, and guest rooms to personalize and virtual stuff to buy.**	**live/tweens/teens/vw**	**90**
Handipoints	www.handipoi nts.com	A virtual world that allows parents to program in virtual (and real) rewards as well as using the pre-programmed reward system for chores complet ed.	live/kids/adults/vw	< 1
IMVU	**www.imvu.com**	**A virtual chat world with 3D avatars and lots of virtual products to buy in t he IMVU catalogue.**	**live/teens/adults/vw/ SocNet/chat world**	**20**
Lego Universe	www.universe.lego.com	A massive multiplayer online game with little people called minifigs that can run, jump, build, buy, sell, form teams, chat, go on quests, and solve puzzles.	coming/kids/MMORPG	< 1
Lola's Land	www.lolasland.com	A new online virtual world based on the book character Lola Love that includes features, pop star interviews, games, social networking and custom avatars.	live/tweens/teens/vw	< 1

Name	Web Address	Description[a]	Categories[b]	Registered Accounts (millions)[c]
MyMiniLife	www.myminilife.com	A combination virtual world and social network with avatars, virtual products, and homes you can customize and decorate.	live/teens/adults/vw	< 1
Neopets	**www.neopets.com**	**A world where members care for virt ual pets and buy them food, toys and treats with a virtual currency they earn by trading stocks, playing games, setting up shop, or winning contests.**	**live/kids/tweens/teens/ adults/vw**	**45**
ourWorld	www.ourWorld.com	Designed for tweens between the ages of 8 to 12, this virtual worl d offers 2D avatars and a flash-based world. Kids can play MMORPGs complete with quests and goals, or play simple games, get jobs, earn “flow” money to spend on virtual prizes.	live/tweens/teens/vw/ MMORPG	< 1
SmallWorlds	www.smallworlds.com	3D virtual world that runs on a browser without any need to instal l special software and enables players to build rooms, houses and even their own world and fi ll it with items and fun activities with friends.	live/adults/vw/custom	< 1

Name	Web Address	Description[a]	Categories[b]	Registered Accounts (millions)[c]
Stardoll	**www.stardoll.com**	**A virtual world designed for girls ages 7 to 17 where they can design clothes for their own avatar doll or for celebrity dolls and meet friends from all over the globe.**	**live/kids/tweens/teens/vw**	**17**
Tech Deck Live	www.techdecklive.com	A virtual world based on a skate-board theme with avatars, outfits, competitions and fri ends	coming/kids/tweens/teens/adults/vw	< 1
Teen Second Life	http://teen.secondlife.com	A virtual world version of Second Life reserved for young people ages 13 to 17 with avatars, accessories, weapons, armies, land, entertainment events and educational opportunities.	live/teens/vw	< 1
Ty Girlz	www.tygirlz.com	A virtual world for girls including fashion, chat, games, and shopping which can be unlocked using a secret code found on a real world Ty Girlz doll.	live/tweens/teens/vw	< 1
VizWoz	www.vizwoz.com	A virtual world for teens with games, chat, a variety of themed worlds, avatars, hover boards, and lots of film, sports, movies and fashion.	live/teens/vw	< 1

Name	Web Address	Description[a]	Categories[b]	Registered Accounts (millions)[c]
vSide	www.vside.com	A virtual world designed for people over t he age of 13 where you can customize an avatar, chat with friends, visit amazing cities, dance and enjoy the nightlife.	live/teens/adults/vw	< 1
Webkinz	**www.webkinz.com**	**A virtual world for children which is accessed t hrough a code on a real world Webkinz pet, and which then allows children to play and care for their pets, chat, play games and earn virtual cash.**	**live/kids/vw**	**1**
WeeWorld	**www.weeworld.com**	**A social network built for fun where members can meet and interact with WeeMees (cartoon avatars that look like their owners), invite friends, send messages, play games and create an online cartoon page.**	**live/tweens/teens/adults/vw/ SocNet**	**21**
Whirled	www.whirled.com	A web-based social world for chat, games and player-created content.	live/adults/SocNet	< 1

Name	Web Address	Description[a]	Categories[b]	Registered Accounts (millions)[c]
Whyville	**www.whyville.net**	**A virtual world dedicated to education using games and role-playing. Members can earn virtual money to start their own businesses.**	**live/tweens/teens/vw**	**3**
World of Neopia	www.neopets.com/world.phtml	An updated Neopets with new links and new activities.	coming/tweens/vw	< 1
Xivio	**www.xivio.com**	**A flash-based MMORPG virtual world with social networking components such as blogs, vi deo, picture sharing and music.**	**live/kids/vw/ MMORPG/SocNet**	**1**

Note. Bolded entries indicate virtual worlds with over one million registered accounts.
[a] Descriptions from: Association of Virtual Worlds. (2008, August). *The blue book: A consumer guide to virtual worlds*.
[b] Categories:

- *Coming*: This world is in the planning and/or development stage and has not yet gone live.
- *Live*: This world is now live though perhaps still in a testing stage.
- *Kids*: Designation for worlds aimed at children starting at age 3.
- *Tweens*: Designation for worlds aimed at youth ages 10 to 12 or 8 to 12, depending on the site.
- *Teens*: Designation for worlds aimed at youth ages 13 to 19.
- *Adults*: Designation for worlds aimed at adults.
- *VW*: Environments with 3-D element s such as avatars and living spaces.
- *MMORPG*: Massive multi-player online role-playing game.
- *SocNet*: Social Network.

[c] As reported by: KZERO Research. Virtual world total registered accounts. Retrieved July 25, 2008 from http://www.kzero.co.uk/blog/wp-content/uploads/2008/05/virtual-world-numbers-q2-2008.jpg.
[d] Also adapted from "*D is for digital: An analysis of the children's interactive media environment with a focus on mass marketed products that promote learning*" by C. Shuler, 2007, The Joan Ganz Cooney Center at Sesame Workshop, p. 19.

Appendix B: Additional Information about the Virtual Communities of Learning and Care Project at Children's Hospital Boston

Curriculum. The curriculum for the study with the post-transplant patients was designed to be one of emergent nature, though guidelines were in place for the mentors to facilitate activities throughout the 32 week intervention period on Zora. Besides activities meant to foster peer networking, other activities centered on the issue of medical adherence as well as getting the participants to become more comfortable discussing their transplant experience. For instance, when the moderator, a doctoral student in child development, noticed that the participants were starting to share experiences about their transplant history, she would encourage them to document these in a "Transplant House". When they would start sharing information about medication, she would encourage them to build a "Pharmacy" so they might post and share responses to questions such as "how do you remember to take your medication?"

While both the Transplant House and Pharmacy were included in the original curriculum, the moderator waited until she could see the online conversation naturally directed itself to one of these topics at which point she knew that participants were ready to talk about sensitive issues pertaining to their health. The components of the curriculum were conceived as general guidelines, and new ideas for projects coming directly from the patients were encouraged and welcomed. For example, during Halloween, participants chose to collaboratively build a Halloween virtual house with objects representing their own fears.

Mentoring model. The facilitator was a child development doctoral student with experience in child health and a clear agenda in terms of the research and learning goals of the project. The facilitator coordinated weekly Zora on-line activities but spent most of her time helping participants with the technical aspect of the program, from installing it to supporting creative uses. Although the goal was for the facilitator to progressively move towards getting the participants to help each other, this happened very slowly as children were on different schedules. Our mentoring model was composed of a facilitator and several mentors, older teenagers who had had a transplant were identified as potential mentors for the Zora community and were invited to join. For example, when participants discussed on-line their worries about going to college and not having their mothers around to help them to remember to take their medications, the project team asked one of the mentors, a college student with a transplant, to come on-line to talk about his own experience. The long-terms plan is to have the participants, as they become older, to assume the role of mentors.

Project scale. Although 22 post-transplant patients signed consent forms, only nineteen used Zora and half of them participated on a regular basis. Although at the beginning of the project, scale was not an issue and children were happy to meet for the first time other post-transplant children, as the project evolved, children wanted to have more participants, as it was difficult to have synchronous activities and conversations. Throughout the study, the project team held weekly online meetings at two different times to accommodate different participants' schedules. In addition, the voluntary nature of the project meant that the project team could not enforce regular attendance. Thus there might be as few as one or two participants attending planned activities. However, participants would be online at other times to work on individual projects. Due to the "constant on" nature of this project, participants were welcomed to sign on at any time; however, our data showed that in many cases, a participant who logs on and finds that only one or two other members are on would sign off. This may be due to the lack of a minimum critical mass to sustain participants' engagement. Other researchers (e.g., Markus, 1987; Preece, 2000) have shared similar experiences for the need to have a minimum critical mass when building a social network or a virtual community.

Contact with participants. Besides regular online contact with the regular participants, the project team made home visits to a few local participants' homes to gain an understanding of the environment and context in which Zora was being used. The project team also arranged to meet some patients at the time of their regular hospital's clinical visits or while they were hospitalized for treatment. However, depending on the time since transplant, the frequency of the participants' routine visits to the hospital varied; therefore the project team could not arrange to meet every participant and their family. For those participants whom a member of the project team could not visit either at home or at the hospital, interviews were conducted over the phone. In addition, users created a monthly newsletter, Transplant Times, that reported on some of the key activities that took place on Zora. The newsletter was printed and mailed to all participants, their families and hospital staff. At the end of the year, the project team organized a Zora group who would represent the virtual community of transplant patients at the hospital's annual fund raising walk. Five of the participants and their families joined for the walk which gave us, and them, the chance to meet other face-to-face.

Data collection and assessment. Data collection included automatically generated logs that provided qualitative and quantitative data of user's online activities, self-report instruments and semi-structured interviews, as well as spontaneous feedback. Three sets of data were collected: (1) data pertaining to Zora use and participant feedback through semi-structured face to face or telephone interviews, as well as Zora logs, and home visits to check for fidelity in the way the system was used by the patients and the ways it was intended to be used; (2) data pertaining to the positive development of youth through the use of technology collected through questionnaires; and (3) data about patient's medical adherence and medical history provided by parents, medical staff and children's themselves.

Appendix C: ClubZora Code of Conduct

I agree to follow this code of conduct while I am using the Zora computer system:

- Use responsible and appropriate behavior as well as appropriate words in your biography, stories, values, object descriptions and when chatting. Be respectful so others don't feel insulted or offended. Keep in mind that some of the participants might be younger than you. If you don't like what someone does or says, please tell or email your Clubhouse Coordinator or email Laura Beals at ClubZora@tufts.edu. If you are not sure if something will offend someone, first ask yourself: Would I like it if someone did this to me? Everything that is typed into the computer or displayed in the system will be monitored to make sure that all participants are using responsible and appropriate language and behavior.
- Ask questions if there are things that you do not understand.
- If you think that there are new rules that need to be added to this list, please send them to us.
- Keep in mind that we will not use a product or commercial software. It is a prototype system built for research purposes. Therefore it might have bugs or technical problems. Please report them to us so we can try to fix them.
- Never enter your address or phone number in Zora. This is important in order to keep your privacy and security.
- The Clubhouse Code of Conduct is also in use in Zora.

Appendix D: Sample Emails Received from Youth Participants by the Project Administrator during the ClubZora Project

November 5, 2007

```
I HAVE SIND UP SEVRUL OF TIMS SO WHY CAN I NOT GO ON AND WHY HAVE
YOU NOT EMELD ME YET.
```

November 11, 2007

```
how do u get 2 that websit?
```

[from the same user, after I had responded to the above email with instructions]

November 25, 2007

```
hi how do i make a club zora i dont know how to go and i looked
it up at www.ClubZora.com but it didnt show up i need help!!!!!:)
```

November 29, 2007

```
Dear Luara my name is marcy and I wanted to appologize to you. on
teusday november 27 I said some disrspecting words on zora. i had
some time to think about what i did and I felt that an applogy
was do to you and my clubhouse cordinators. It was a bad day for
me and took it out on innocent people. I hope that you will
except my appolgy because i feel so bad about it and i promise to
never do it again.:(
Please write me back in response.

sicerelly
marcy :):D
```

December 10, 2007

```
Hi, I had a question about Club Zora. Can I acess it from home or
can you only do it at the Clubhouse? I think it's a really cool
program and I want to play it more.
```

December 21, 2007

```
Hello I have a question i'm new and I wanted to know how you
decorate your background.plz i don't want my page to look lame.

Sincerely,
dare210
```

December 30, 2007

[Note: This email was from a member located in a Clubhouse in Latin America, and for whom English was a second language.]

```
hey laura..you are doing an amazing job..zora is grate..
but i needed to tell you that some times we still have some
problems loging in ..and i kept installing it many times on my
laptop..so i connect at night and meet with others across the
earth :P
but it just wont work
i followed the guide and everything but no it wont work
thanks anyway
grate job you do!
```

January 3, 2007

[In response to sending the login information]

```
yo thx 4 real much luv 2 ya peace
```

January 8, 2008

```
Good after noon ms. beals this is dare210 im having a hard time
with clubzora my friend said something about teleport i am
soooooooo
confused plz help!!!!!111111
```

February 6, 2008

```
Hello? Oh.. Hi Mrs. Laura! I'm max, and I just wanted to know,
why there aren't that many avatars on Club Zora! I'd really
appreciate it! SEE YA!
```

March 4, 2008

```
dear laura,
It seems as that every time that me and andy create a house then
on the thing does not show on the teleport bar. can you fix the
problem soon please.
                                                regards
                  emma
```

May 19, 2008

[Note: Original formatting retained]

Hello Laura,

I'd like to have a meeting with you on Club Zora! This is alexm! I'm so sorry that this is so urgent! I've just been in need! I need help getting the same poem that aclarke has! I want it really bad! Even though she's my "sister" she still refuses to give me the info.! PLEASE HELP ME! I'll see ya later! Thank-you for reading my letter!

Sincerely,

Alex Smith

P.S. I'm hoping that you're able to meet me either tommorow, or on Wednessday! I'll see ya around! Bye!

[From the same user the next day]

Dear Laura,

Hello Mrs. Laura! I'd like to meet at my house! It's on the first level of "Animal Crossing House" & on the first level of "Mario House"! Well..., I guess I'll be seeing you around! Bye!

Love,

Alex Smith

P.S. I'd love it if you'd be able to come on Thursday, at 4:50 P.M.! Well, contact me tommorow when you've thought of a date! Bye! 

May 22, 2008

```
Hey Laura,
Someone was on my account my house and all my pictures have
vanished we need to change my password please
Regards
Sarah
```

May 29, 2008

```
I have tried my new password over and over again and it says
invailid password i'm wondering how I can get back into the
clubvillage
```

Appendix E: Criteria and Method for ClubZora Group Assignment

Data for this project were collected by two means: data provided to us by the Clubhouse Network—such as demographic information—and data from the Zora software (as described above, from the logs and prop dumps). For this paper, the specific usage data used included the variables: (1) total time online, (2) total number of logins, (3) total number of objects, and (4) total number of lines of chat. However, because enrollment in the project spanned 11 months, from November 2007 until October 2008, these usage variables needed to be weighted in order to account for the different lengths of time that enrollees had access to Zora.[53] Therefore, a weighted variable for each usage variable was computed by using the following formula:

*Weighted Variable = (Original Variable Value) * Proportion of Days in Zora*

where

$$\text{Proportion of Days in Zora} = \frac{\textit{Number of Days from Date of Enrollment to 10/1/2008}}{\textit{Total Number of Days Zora was Available}}$$

where

Total Number of Days Zora was Available = 335 (November 1, 2007 to October 1, 2008).

From henceforth in this paper, all usage variables presented are these weighted values, unless specified otherwise.

Furthermore, because there was an extremely large range in the time spent online (N = 563, minimum = 0 minutes, *maximum* = 1071.02 minutes, M = 39.88

[53] A similar procedure was completed prior to analysis for participants in the Zora at Children's Hospital Boston project (Bers, Beals, Chau, Satoh, Blume et al., 2010).

minutes, *SD* = 103.75 minutes) and number of logins (*N* = 562, *minimum* = 0, *maximum* = 589.95, *M* = 12.93, *SD* = 41.13), combining all of the enrollees into one large group for analysis would not present an accurate picture of participation in the ClubZora project. Therefore, enrollees were first assigned to one of two groups: participants and nonparticipants. The criteria to be assigned to the participant group were that an enrollee had to have logged into Zora two or more times, as this showed they returned to Zora after their initial experience, and spent four or more minutes in Zora. This four-minute cutoff was based on the fact that the Zora log rounds the time online to the whole minute; meaning, for each of the two sessions the user needed to be logged at for a minimum of two minutes in order to ensure that users spent more than one minute in the software at each session.[54] For this determination, the unweighted variables were used because they represent a more accurate picture of a user's first experiences with the program.

Within the resulting participant group, there were several users who had extremely high numbers of logins and time spent online. Including them in the analysis of "normal" participants would have also not resulted in an accurate understanding of user participation. Therefore, these participants needed to be separated into a separate group, called "extreme users." These extreme users were defined as participants whose z-score for time logged into Zora (the weighted

[54] This was also confirmed with exploratory data analysis of the frequency of length of login where the unit of analysis was one minute of time online.

variable was used here as it did need to reflect their entire experience with the program) was greater than 2.5.[55]

Then, the participant and nonparticipant groups were further divided into Coordinators/Mentors and youth to more accurately understand how the members of the Clubhouse Network, of which Mentors and Coordinators are an important component, participated in the project. This resulted in a total of 5 groups (*N* for all enrollees = 562):

1. Youth nonparticipants (*N* = 229)
2. Coordinator/Mentor nonparticipants (*N* = 60)
3. Youth participants (*N* = 201)
4. Coordinator/Mentor participants (*N* = 64)
5. Extreme Users (*N* = 9)

[55] This represents scores that were greater than 2.5 standard deviations from the mean; therefore are outliers.

Appendix F: Results Tables from the Analysis of Participation in the ClubZora Project

Table F1

*Countries Represented by Youth Participants in the ClubZora Project (*N *= 201).*

	Number of Youth Participants	*Percent of Total Youth Participants*
United States	128	63.7
Colombia	23	11.4
Costa Rica	16	8.0
Jordan	10	5.0
Mexico	10	5.0
Australia	7	3.5
Panama	2	1.0
Philippines	2	1.0
Ireland	1	0.5
New Zealand	1	0.5
United Kingdom	1	0.5
Total	201	100.0

Table F2

*Regions Represented by Clubhouse Youth Participants in the ClubZora Project (*N *= 201).*

	Number of Youth Participants	*Percent of Total Youth Participants*
West Coast	65	32.3
Latin America	51	25.4
Midwest	19	9.5
Southeast	18	9.0
Southwest	13	6.5
Asia-Pacific	12	6.0
Europe-Middle East-Africa	12	6.0
Northeast	11	5.5
Total	201	100.0

Table F3

Results of a Oneway ANOVA with Usage of the Zora Software—Time Online, Number of Logins, Number of Objects, and Line of Chat—by Youth Participants in the ClubZora Project by Clubhouse Region.

	df	*F*	*p*
Time Online	7, 193	1.10	.36
Number of Logins	7, 193	1.16	.33
Number of Objects	7, 108	0.65	.71
Lines of Chat	7, 120	0.56	.79

Table F4

Results of a Oneway ANOVA with Usage of the Zora Software—Time Online, Number of Logins, Number of Objects, and Line of Chat—by Youth Participants in the ClubZora Project by Age.

	df	*F*	*p*
Time Online	7, 193	1.10	.36
Number of Logins	7, 193	1.16	.33
Number of Objects	7, 108	0.65	.71
Lines of Chat	7, 120	0.56	.79

Table F5

Gender, Age, Region, and Language Degrees of Freedom, N, *Chi-Square Value, and* P-*Value from a Chi-Square Test of Goodness-of-Fit Comparing the Distribution of ClubZora Youth Participants and that which would be Expected from* The Village *Population, Based on Expected Values Provided by Village Staff.*

	df	*N*	χ^2	*p*
Gender	1	201	11.00	.001
Age	10	191	23.50	.01
Region	7	201	45.12	.001
Language	1	201	21.59	.01

Table F6

Observed and Expected Values for Gender, Year of Birth, and Region Distribution of Youth Participants Based on Statistics from The Village.

	Observed N	*Expected N*	*Residual*
Gender			
Male	130	106.5	23.5
Female	71	94.5	-23.5
Total	201		
Year of Birth			
1989	6	7.9	-1.9
1990	10	11.8	-1.8
1991	13	15.8	-2.8
1992	17	21.7	-4.7
1993	11	23.6	-12.6
1994	24	23.6	.4
1995	28	23.6	4.4
1996	32	21.7	10.3
1997	29	17.7	11.3
1998	15	13.8	1.2
1999	6	9.8	-3.8
Total	191		
Region			
Asia-Pacific	12	17.9	-5.9
Europe-Middle East-Africa	12	16.4	-4.4
Latin America	51	26.8	24.2
Midwest	19	13.4	5.6
Northeast	11	20.8	-9.8
Southeast	18	26.8	-8.8
Southwest	13	26.8	-13.8
West Coast	65	52.1	12.9
Total	201		
Language			
English	150	172.9	-22.9
Spanish	51	28.1	22.9
Total	201		

Table F7

*Countries Represented by Youth Nonparticipants in the ClubZora Project (*N = *229).*

	Number of Youth Nonparticipants	*Percent of Total Youth Nonparticipants*
United States	139	60.7
Colombia	17	7.4
Jordan	16	7.0
Costa Rica	10	4.4
Australia	8	3.5
Mexico	8	3.5
Panama	7	3.1
Philippines	6	2.6
Brazil	3	1.3
New Zealand	3	1.3
Palestine	3	1.3
United Kingdom	3	1.3
Argentina	2	0.9
Ireland	2	0.9
Denmark	1	0.4
Russia	1	0.4
Total	229	100.0

Table F8

*Regions Represented by Clubhouse Youth Nonparticipants in the ClubZora Project (*N *= 229).*

	Number of Youth Nonparticipants	*Percent of Total Youth Nonparticipants*
West Coast	61	26.6
Latin America	47	20.5
Europe-Middle East-Africa	26	11.4
Midwest	24	10.5
Southeast	23	10.0
Asia-Pacific	17	7.4
Southwest	16	7.0
Northeast	15	6.6
Total	229	100.0

Table F9

Gender, Age, Region, and Language Degrees of Freedom, N, Chi-Square Value, and P-Value from a Chi-Square Test of Goodness-of-Fit Comparing the Distribution of ClubZora Youth Nonparticipants and that which would be Expected from The Village *Population, Based on Expected Values Provided by Village Staff.*

	df	*N*	χ^2	*p*
Gender	1	229	8.20	.004
Age	11	223	18.97	.062
Region	7	229	29.36	.000
Language	1	229	13.01	.000

Table F10

Observed and Expected Values for Gender, Year of Birth, and Region Distribution of Youth Nonparticipants Based on Statistics from The Village.

	Observed N	*Expected N*	*Residual*
Gender			
Male	143	121.4	21.6
Female	86	107.6	-21.6
Total	229		
Year of Birth			
1989	11	6.7	4.3
1990	21	13.4	7.6
1991	21	17.8	3.2
1992	21	24.5	-3.5
1993	25	26.8	-1.8
1994	26	29.0	-3.0
1995	28	26.8	1.2
1996	26	29.0	-3.0
1997	24	20.1	3.9
1998	15	15.6	-0.6
1999	4	11.2	-7.2
2000	1	6.7	-5.7
Total	191		
Region			
Asia-Pacific	17	20.4	-3.4
Europe-Middle East-Africa	26	18.7	7.3
Latin America	47	30.5	16.5
Midwest	24	15.3	8.7
Northeast	15	23.7	-8.7
Southeast	23	30.5	-7.5
Southwest	16	30.5	-14.5
West Coast	61	59.4	1.6
Total	229		
Language			
English	178	196.9	-18.9
Spanish	51	32.1	18.9
Total	229		

Appendix G: Complete Chat Conversation on November 17, 2007 Regarding Role-Playing in "Area 34."

Name	Time	Message
blacktooth	02:41:13	Cmdr. Meowmix please report to the Main Complex. Thank you.
stingy42	02:41:20	Fine...
blacktooth	02:47:20	This is 34 command. Lunch will be served today in Cmdr. Meowmix's private quarters. All soldiers and non-essental crew should report there for their daily rations.
gameruler	05:22:51	come with me
gameruler	05:23:35	come with me laura
Laura	05:23:39	ok
gameruler	05:24:13	go to area 34
mrice1995	05:25:36	Hey were is area 34
Laura	05:25:43	wow
Laura	05:25:47	that is pretty amazing!
gameruler	05:26:13	come in
Laura	05:26:20	nice job!
gameruler	05:26:36	read
Laura	05:27:05	haha
gameruler	05:27:13	laura
Laura	05:27:15	do i have to leave my name *(They had created a sign outside the entrance to the commander's office that asked people in the waiting area to put their name on a waiting list to see the commander)*
gameruler	05:27:22	no
gameruler	05:27:28	come here
Laura	05:27:36	i see
Laura	05:27:46	i have to wait for you to let me enter
Laura	05:27:47	clever
gameruler	05:28:04	do you wount to talk to cmdr. meowmix
Laura	05:28:09	sure
Laura	05:28:12	that would be great
Laura	05:28:17	if he allows
gameruler	05:28:25	you can go up now
Laura	05:28:41	how do i get there>
Laura	05:28:44	you need a sign
gameruler	05:28:44	come with me

Name	Time	Message
Laura	05:28:49	ah! escorted!
gameruler	05:29:19	plz wat here
Laura	05:29:22	ok
gameruler	05:30:11	give thim a message
Laura	05:30:23	a message? how?
gameruler	05:30:37	you now how
Laura	05:30:37	on the sign?
gameruler	05:30:49	yes right clik
gameruler	05:32:24	plz come with me if you are doun
Laura	05:32:29	ok
gameruler	05:33:27	i will tell cmdr later sary to bother you
Laura	05:33:50	no bother. i appreciate the time. please pass my regards to the cmdr
gameruler	05:34:42	he is on now
Laura	05:35:17	well if he can find the time to fit me in
Laura	05:35:19	just let me know
gameruler	05:35:41	come with me
gameruler	05:36:35	come with me
gameruler	05:36:57	he here
mrice1995	05:37:04	Hey Laura were are you
gameruler	05:37:05	come with me
Laura	05:37:46	should i wait?
gameruler	05:37:52	yes
gameruler	05:38:19	you may go in now
Laura	05:38:24	ok
gameruler	05:38:40	go
Laura	05:38:44	hello
Laura	05:38:48	you should have a message board
Laura	05:38:59	so we could talk without everyone having to read
stingy42	05:39:08	said That I should... For those extended conferences
stingy42	05:39:45	said Oh yes... Cmdr. Solaris says "Hi"
gameruler	05:39:56	cmdr.
Laura	05:39:57	two cmdrs? wow.
stingy42	05:40:03	said Yep
Laura	05:40:05	i wll brb
gameruler	05:41:36	you may go laura
gameruler	05:42:01	sammyz do you wont to see cmdr.
Laura	05:42:04	ok

Name	Time	Message
Laura	05:42:06	thank you for your time
gameruler	05:42:36	sit everyone
gameruler	05:43:04	stay here
Laura	05:43:07	ok
gameruler	05:43:13	not you
gameruler	05:43:28	laura
stingy42	05:43:59	said Send someone in... Please... My secretary is so fired after this...
gameruler	05:44:04	sary come with me
mrice1995	05:44:19	Who me
Laura	05:44:23	where do you want it?
gameruler	05:44:37	you may go in mrice
mrice1995	05:45:02	okay thanks
gameruler	05:45:29	laura
Laura	05:45:36	yes?
gameruler	05:45:47	come with me
Laura	05:45:54	ok
cookie1995	06:37:36	come to area 34
cookie1995	06:38:35	come yo area 34
cookie1995	06:41:33	please sit down
theprincess	06:42:01	i cant
cookie1995	06:43:22	somebody is here for you
gameruler	06:43:31	thanx
gameruler	06:43:50	tell her to come here
cookie1995	06:44:18	he is ready for you
theprincess	06:44:22	ok
theprincess	06:44:45	What now
gameruler	06:44:58	do you wont a job or to see cmdr.
theprincess	06:45:13	will i get paid
gameruler	06:45:25	no it a game!!!
theprincess	06:45:43	lol yes
theprincess	06:45:53	job
gameruler	06:46:12	come with me princes
gameruler	06:48:40	give him a message
theprincess	06:48:50	who
cookie1995	06:56:54	hello
cookie1995	06:58:33	yes sir
cookie1995	07:02:17	please wait
stingy42	07:07:14	said What do you need?

Name	Time	Message
stingy42	07:07:27	said Please take a seat
stingy42	07:07:33	said Be civilised
theprincess	07:07:41	OK
stingy42	07:07:52	said What is your wquarry?
stingy42	07:08:18	said Hurry with this I have construction to do
theprincess	07:08:22	Can I have a job Please
stingy42	07:08:36	said What job are you interested in?
theprincess	07:09:16	Do you hve jobs like janitor
stingy42	07:09:38	said Why would you want to be a janitor?
theprincess	07:10:13	Because it is helps the community stay clean and not dirty and stinky
stingy42	07:10:31	said That happens to be quite dum...
theprincess	07:10:42	Fine
theprincess	07:11:39	instead i want to be security guard
stingy42	07:12:03	said Fine...
gameruler	07:12:51	do you wont to see cmdr.
Edwina	07:12:58	?
Edwina	07:13:00	sure?
gameruler	07:13:06	sit plz
Edwina	07:13:10	I don't know meowmix...
gameruler	07:13:20	yes
stingy42	07:13:22	said Come back later then....
cookie1995	07:13:30	hello
stingy42	07:13:36	said Exit!
Edwina	07:13:42	working on it.
gameruler	07:13:46	you may go in
stingy42	07:13:47	said Not yo Edwina
Edwina	07:14:00	so confused
gameruler	07:14:34	go in edwina
stingy42	07:14:48	said Hello there!
Edwina	07:14:53	yo
gameruler	07:15:09	brownie
stingy42	07:15:11	said Please ignore my secretary... He's new...
Edwina	07:15:18	I... see.
gameruler	07:15:27	ha ha
gameruler	07:15:42	cookie
cookie1995	07:16:12	sorry
gameruler	07:16:23	take princes to my place
cookie1995	07:16:53	please follow me

Name	Time	Message
theprincess	07:17:33	ok
gameruler	07:18:41	edwina how do you like area 34
gameruler	07:19:00	ok
theprincess	07:19:03	now what
gameruler	07:19:15	edwin come with me
cookie1995	07:19:32	wait here
theprincess	07:19:37	ok
theprincess	07:19:51	hi
Edwina	07:19:55	hi princess
gameruler	07:20:03	plz sit edwin and princess
theprincess	07:20:34	ji
Edwina	07:20:35	sit being a relative term
gameruler	07:20:43	brownie
Edwina	07:21:40	I love how my name is now edwin.
cookie1995	07:22:03	edwin please come
theprincess	07:22:20	cool
Edwina	07:22:39	um what?
gameruler	07:22:44	edwin come here
Edwina	07:22:50	yo
gameruler	07:23:09	you my go now
gameruler	07:23:23	PRINCESS
theprincess	07:23:37	wat
gameruler	07:23:42	come here
theprincess	07:23:50	yo
Edwina	07:23:56	take the red pill princess!
gameruler	07:23:58	you may go or stay
theprincess	07:24:03	why
theprincess	07:24:08	ok
gameruler	07:24:16	for what
Edwina	07:24:20	I'm just joking :D
theprincess	07:24:58	stay for awhile and then i will go
theprincess	07:25:08	alright
gameruler	07:25:32	bye bell
theprincess	07:25:40	bye
gameruler	07:26:03	brownie
cookie1995	07:26:09	yes
gameruler	07:26:17	come with be
gameruler	07:26:20	me
gameruler	07:28:18	edwin

Name	Time	Message
Edwina	07:28:26	yup
gameruler	07:28:37	come with us
Edwina	07:28:40	kk
gameruler	07:29:04	b
gameruler	07:30:05	brownie
cookie1995	07:30:38	yes
gameruler	07:30:54	let them sit
gameruler	07:31:58	edwin
Edwina	07:32:22	hm?
gameruler	07:32:33	do you wont a job
Edwina	07:32:42	as what?
gameruler	07:33:14	edwin do you wont a job
Edwina	07:33:27	sure
gameruler	07:33:37	you are my cop
Edwina	07:33:48	ok
gameruler	07:34:24	you see who comes in you say what is your name
Edwina	07:34:30	kk
gameruler	07:35:10	if thay dont give you there name then you say sarry you cant go in
Edwina	07:35:15	ok
cookie1995	07:35:19	what now?
Edwina	07:35:26	their real name or their sn?
Edwina	07:35:34	brownie is the secretary?
gameruler	07:35:50	no you are
Edwina	07:35:56	right-o
gameruler	07:36:10	brownie go get people
cookie1995	07:36:24	yes sir
gameruler	07:36:51	hellow edwin
Edwina	07:36:58	hello gameruler
gameruler	07:36:58	your a boy
Edwina	07:37:01	no
Edwina	07:37:10	but I thought a cop should be the Butch avatar.
gameruler	07:37:14	your avatar
Edwina	07:37:20	yup.
gameruler	07:37:53	come here
gameruler	07:38:18	you are here
Edwina	07:38:23	so it would seem.
cookie1995	07:38:28	hello
gameruler	07:38:34	no you work here

Name	Time	Message
Edwina	07:38:39	True.
cookie1995	07:38:46	anyone
gameruler	07:38:55	stay at your post
Edwina	07:38:59	will do
gameruler	07:39:21	go here
gameruler	07:39:42	yes
Edwina	07:39:49	I let brownie in automatically?
gameruler	07:40:08	go outside
cookie1995	07:40:09	whoohooo
gameruler	07:40:31	edwin go outside
Edwina	07:41:24	nice.
cookie1995	07:41:35	-dude
cookie1995	07:42:02	yay
gameruler	07:42:13	edwin you tell me the name and ill let them in my way
Edwina	07:42:25	All right.
gameruler	07:42:27	come in
cookie1995	07:43:42	d'oh
gameruler	07:43:58	brownie
cookie1995	07:44:14	yes and yes
gameruler	07:44:52	brownie
cookie1995	07:45:01	yes
gameruler	07:45:35	go out and get people
cookie1995	07:45:55	yes but i can't find any
gameruler	07:46:16	there may be people now
cookie1995	07:46:28	okay
cookie1995	07:47:49	anyone answer me
Edwina	07:48:07	cookie1995 gameruler erickad theprincess and monhad are on.
gameruler	07:48:55	do it and you get promouted
Edwina	07:49:22	What is your name?
Edwina	07:49:27	oh it's brownie
cookie1995	07:49:38	brownie
Edwina	07:49:52	proceed
cookie1995	07:52:37	isaac come to your houseif your there
Edwina	07:54:39	hello Pharoh person what is your name?
gameruler	07:54:54	thats cmdr.
stingy42	07:54:56	said I is Cmdr. Meowmix aka Max yo
Edwina	07:55:05	yo

Name	Time	Message
Edwina	07:55:23	You are certainly allowed to enter then
cookie1995	07:56:04	ah man
Edwina	07:56:05	I couldn't find cmdr's name for a second
erickad	07:56:16	where are you
Edwina	07:56:18	right-click on the person to find out
gameruler	07:59:53	brownie
cookie1995	08:00:15	yes
gameruler	08:00:37	you are promoded\
cookie1995	08:00:51	wooohooo
Edwina	08:00:57	yay
gameruler	08:01:09	you now ......
cookie1995	08:01:21	no i don't
gameruler	08:01:50	crap on people
Edwina	08:02:00	...
cookie1995	08:02:10	......?
Edwina	08:02:30	what is your name?
Edwina	08:02:43	Hello?
Edwina	08:02:51	I'm sorry you can't come in now.
Edwina	08:02:51	I'm sorry you can't come in now.
gameruler	08:03:00	you now help me
Edwina	08:03:10	blue dress lady?
gameruler	08:03:21	with mittings
Edwina	08:03:48	someone in a blue dress has entered...
cookie1995	08:04:07	where?
Edwina	08:04:14	went in the middle door
gameruler	08:04:36	chery you are coming to a mitting
Edwina	08:04:42	ok
Edwina	08:04:50	shall I follo you?
gameruler	08:04:58	hi blue
gameruler	08:05:15	what is your name
erickad	08:05:34	What yall want with me
gameruler	08:05:45	nothing
cookie1995	08:05:51	okay person
gameruler	08:05:52	come with me plz
Edwina	08:05:54	wanted to know your name
erickad	08:06:06	My name is Ericka
Edwina	08:06:34	Hi Ericka
Edwina	08:06:36	you can come in
gameruler	08:06:56	will you come with me ericka

Name	Time	Message
erickad	08:07:04	Yes
erickad	08:07:44	What is your name
Edwina	08:08:00	stupid thing crashed again- what'd I miss?
gameruler	08:08:03	gameruler
stingy42	08:08:14	said Nothing
gameruler	08:08:19	ediwn come with me
Edwina	08:08:30	kk
gameruler	08:09:07	edwin cmdr. has somethig to say
erickad	08:09:09	What is your real name
gameruler	08:09:40	ewdin come with me
cookie1995	08:09:40	who?
Edwina	08:09:59	there we go
Edwina	08:10:02	not so good at flying.
erickad	08:10:03	What is your name
gameruler	08:10:04	go to a girl
Edwina	08:10:14	to ericka?
cookie1995	08:10:25	why
gameruler	08:10:25	you go to a girl
erickad	08:11:05	Are you guys talking to me
Edwina	08:11:15	I wasn't sorry
gameruler	08:11:16	no
Edwina	08:11:26	I just changed my avatar.
gameruler	08:11:35	come in every one
gameruler	08:12:18	erickad sit out in the other room

Appendix H: Complete Chat Conversation on November 16, 2007 in which Participants were Playing "Hide-and-Seek."

Name	Time	Message
gameruler	6:18:13	lets do something fun hid and sik
erickam	6:18:22	ok
gameruler	6:18:23	your it
gameruler	06:18:32	cont to 20
erickam	06:18:33	You better run
erickam	06:18:37	ok
carleneg	06:18:53	im playing too
gameruler	06:19:03	ok hide
erickam	06:22:16	Carlene is stunck in the water
carleneg	06:23:01	10
erickam	06:23:38	Carlene is it
carleneg	06:24:16	ur it
erickam	06:25:43	carlene is it
carleneg	06:25:50	hey gameruler
erickam	06:25:57	Where are you gameruler
gameruler	06:26:31	whos it
carleneg	06:26:37	you are now
erickam	06:26:37	Carlene
erickam	06:26:55	Carlene has to count
carleneg	06:27:13	tag
gameruler	06:27:41	tag
carleneg	06:27:48	gameruler you are it count to ten
carleneg	06:28:11	who did you tag
gameruler	06:28:16	tag
gameruler	06:28:21	you
carleneg	06:28:33	ok ill count
carleneg	06:28:36	1
carleneg	06:28:38	2
carleneg	06:28:40	3
carleneg	06:28:42	4
carleneg	06:28:44	5
carleneg	06:28:46	6
carleneg	06:28:48	7
carleneg	06:28:49	8
carleneg	06:28:51	9

Name	Time	Message
carleneg	06:28:55	10!
carleneg	06:29:15	ready or not here i come
erickam	06:30:49	where are you gameruler
elijahw	06:31:54	gameruler where u at
gameruler	06:32:13	were are you
erickam	06:32:33	I just came from the pyrimid
carleneg	06:33:40	you think you slick gameruler you in this box
carleneg	06:34:49	get ut of here
gameruler	06:35:01	no
carleneg	06:35:29	get out ur it
erickam	06:35:30	Gameruler she is right there
gameruler	06:35:38	i kow
elijahw	06:35:41	get in this box
erickam	06:35:42	Do not come out
kc1999	06:35:46	gameruler run!!!!!!
devontaew	06:36:08	you get and the box
carleneg	06:36:08	lets go to max house so that we can play with others
erickam	06:36:20	Who are you kc1999
carleneg	06:36:37	kc199 im gonna get ya
marcyk	06:37:05	where areb you gameruler
gameruler	06:37:05	hold on
elijahw	06:37:10	gameruler get in this box
marcyk	06:37:39	Hurry up gameruler we want to pla to
erickam	06:38:32	Gameruler come on
marcyk	06:38:43	come on we are all here
erickam	06:39:26	Transport to max house
kc1999	06:39:26	im playing
erickam	06:40:54	Where are you at
carleneg	06:41:21	hey game master come to max
marcyk	06:42:39	gameruler marcyk is it
erickam	06:45:02	Gameruler did you leave
gameruler	06:46:14	hi
erickam	06:46:24	Where are you
gameruler	06:46:31	hi
erickam	06:46:43	Gameruler do you want to play
gameruler	06:46:57	what
erickam	06:47:00	it
gameruler	06:47:11	ok

Name	Time	Message
carleneg	06:47:17	i luv them
erickam	06:47:18	Follow me
gameruler	06:47:24	ok
elijahw	06:47:28	gameruler u it
gameruler	06:47:35	nooooooooooooooooooooooooooooooooooooooooooo
gameruler	06:47:42	1
gameruler	06:47:44	2
gameruler	06:47:45	3
gameruler	06:47:46	4
gameruler	06:47:47	5
gameruler	06:47:49	6
gameruler	06:47:50	7
gameruler	06:47:51	8
gameruler	06:47:52	9
gameruler	06:47:56	10!!
gameruler	06:48:40	your it
erickam	06:49:13	Who are it
gameruler	06:49:18	you
marcyk	06:49:37	whos it
marcyk	06:49:50	gameruler who`s it
gameruler	06:49:52	erickam's it
erickam	06:50:04	ok 1
erickam	06:50:06	2
erickam	06:50:07	3
erickam	06:50:08	4
erickam	06:50:09	5
erickam	06:50:10	6
erickam	06:50:11	7
erickam	06:50:12	8
erickam	06:50:13	9
erickam	06:50:14	10
gameruler	06:50:17	RUN
erickam	06:50:36	marcyk
erickam	06:50:39	is it
elijahw	06:50:56	gameruler who it
erickam	06:51:07	You are it
gameruler	06:51:15	Erickam
elijahw	06:51:15	1
elijahw	06:51:18	2

Name	Time	Message
elijahw	06:51:19	3
elijahw	06:51:20	4
elijahw	06:51:21	5
elijahw	06:51:22	5
elijahw	06:51:23	6
elijahw	06:51:24	6
elijahw	06:51:25	7
elijahw	06:51:26	8
elijahw	06:51:27	9
erickam	06:51:27	I tagged marcy
elijahw	06:51:28	0
elijahw	06:51:29	10
gameruler	06:52:53	hi
carleneg	06:53:01	hey game master come back
erickam	06:53:15	where are you gameruler
erickam	06:53:55	Whats up elissa
gameruler	06:54:00	hi
beny	06:54:01	hey carlene
carleneg	06:54:19	gameruler is it
gameruler	06:54:22	bord
carleneg	06:54:35	oh no you didnt
marcyk	06:54:43	are you still playing
elijahw	06:54:46	are u still playing
erickam	06:55:06	what do you want to do
gameruler	06:55:44	best hideing place
erickam	06:55:52	where at
carleneg	06:55:53	gameruler
gameruler	06:55:58	yes
erickam	06:56:05	where at
marcyk	06:56:08	elissa is it
beny	06:56:19	1
beny	06:56:20	2
beny	06:56:22	3
beny	06:56:23	4
beny	06:56:25	5
beny	06:56:26	6
beny	06:56:27	7
beny	06:56:28	8
beny	06:56:30	9

Name	Time	Message
marcyk	06:56:37	gameruler why did you leave
beny	06:56:41	10
marcyk	06:56:48	I see you
carleneg	06:56:53	beny is it game master
beny	06:57:01	i am caming
gameruler	06:57:16	i didn't
erickam	06:57:28	Where are you at gameruler
carleneg	06:57:58	hey i want this hiding spot
gameruler	06:58:18	there
carleneg	06:58:29	thanx
gameruler	06:59:05	yoour welcome
carleneg	06:59:27	come on lets move
gameruler	06:59:34	why
gameruler	07:00:17	you will never find me
erickam	07:00:28	where are you at
erickam	07:00:56	whats up d
beny	07:01:26	i am caming all of you
gameruler	07:01:49	everone plz telloport to gameruler's work place
carleneg	07:02:25	im here
gameruler	07:02:57	sit plz
erickam	07:02:58	i am here