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Abstract

Because of geographic distances, many youth transplant recipients do not have the opportunity to meet and form relationships with peers who have undergone similar experiences. This article explores the role of E-mentorship in virtual environments. Most specifically, by analyzing data from a study conducted with the Zora virtual world with pediatric transplant recipients, suggestions and recommendations are given for conceiving the role of virtual mentors and allocating the needed resources. Zora is a graphical virtual world designed to create a community that offers psychoeducational support and the possibility of participating in virtual activities following a curriculum explicitly designed to address issues of school transition and medical adherence. Activities are designed to foster relationships, teach technological skills, and facilitate the formation of a support network of peers and mentors. This article addresses the research question, "What makes a successful E-mentorship model in virtual worlds for children with serious illnesses?" by looking at E-mentoring patterns such as time spent online, chat analysis, initiation of conversation, initiation of activities, and out-of-world contact.

Keywords

virtual worlds, E-mentoring, pediatric transplantation, intervention, computers

Introduction

As young people discover new ways of using the Internet for engaging in social interaction through social networking sites, multiplayer video games and virtual communities, graphical virtual worlds are emerging as one of the fastest growing online environments for youth (Beals & Bers, 2009). For example, the largest virtual world for adults has 13 million registered users, whereas the largest for children and youth has 90 million users. Furthermore, as of 2008, the Association of Virtual Worlds found that there are more than 360 virtual worlds explicitly targeted at this young population (Association of Virtual Worlds, 2008).

Within the large presence of virtual worlds, Internet-based interventions have been explicitly designed for children facing serious illnesses (Bush, Huchital, & Simonian, 2002). For example, games—video games (Lieberman, 2001) and virtual reality interventions (Schneider & Workman, 2000)—expressive programs—daily phone diaries[24] and Web-based storytelling sites (DeMaso et al., 1995)—and social networking sites (Starbright World; Bush et al., 2002) have been on the rise.

Internet-based psychosocial interventions provide a wonderful opportunity to reach children who, because of geographical distance, cannot attend face-to-face meetings. Participation in a peer-based virtual community engages children in discussion of health-related issues that are important to them and provides a space to share their needs, feelings, and worries. At the same time, a graphical virtual community, such as those afforded by virtual worlds, offers different opportunities for participation. Children can choose to express themselves via online chat and words or by drawing and designing virtual objects (Bers, 2001). However, when these kinds of psychosocial interventions are put in place, it is not only the technology but also the social support systems built around the technology that usually make a difference.

This article explores the role of E-mentorship in virtual worlds for ill children. Most specifically, by analyzing data from a study conducted with the Zora virtual world

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used by pediatric transplant recipients, suggestions and recommendations are given for conceiving the role of mentors and allocating the needed resources for intervention development.

Theoretical Background: E-mentorship

Mentoring refers to a dyadic relationship in which a mentor, a person senior in age or experience, provides guidance and support to a less experienced or younger person, the protégé (DuBois & Karcher, 2005). Psychosocially, a mentor can promote acceptance, role modeling, confirmation, friendship, and counseling (Smith-Jentsch, Scielzo, Yarborough, & Rosopa, 2008). For adolescents, mentors can act as a resource for socialization and academic management; in fact, for young adults entering college, mentorship has been shown to have an impact on satisfaction with one's university and intention to graduate (Sanchez, Bauer, & Paronto, 2006). For youth who are experiencing the vulnerability of illness, though, a caring mentor can act as an additional coping resource (DuBois, Holloway, Valentine, & Cooper, 2002). In fact, DuBois and Silverthorn (2005) concluded that mentoring relationships may contribute positively to a youth's social, emotional, and cognitive development. Additionally, Rousso (2001) evaluated a community-based project that sought to strengthen the educational and social aspirations of adolescent girls with physical and sensory disabilities through relationships formed with mentors. Rousso found that most of the protégés were inspired by their mentors and began to take steps toward greater self-efficacy.

E-mentoring takes place when psychosocial support is provided through virtual technologies such as electronic chat, email, or instant messaging. E-mentoring allows new definitions of mentoring as it "opens the possibility for relationships that cross boundaries of time, geography, and culture unlikely to happen under the classical [face-to-face] model" (Bierema & Merriam, 2002, p. 214). E-mentoring results in interaction opportunities that are different from that in face-to-face mentoring; for example, youth interacting online are more willing to create written text, practice communication skills, and rely on words to connect with others. A study by Smith-Jentsch et al. (2008) compared the relative impact of peer mentoring that took place either face-to-face or through electronic chat. Results indicated that dyads in electronic chat had more interactive dialogue than did those in the face-to-face condition; additionally, those who communicated through electronic chat demonstrated greater self-efficacy after the intervention.

Although E-mentoring cannot replace the value of face-to-face contact, for many youth with critical illnesses, it can bridge the gap between hospital walls and stigmatism. E-mentoring for health-related populations makes mentorship more accessible. Previous work suggests that youth who are isolated, stigmatized, or lack real-world support might be motivated to participate in computer-mediated support that includes E-mentoring (Barak, Hen, Boniel-Nissim, & Shapira, 2008). Cohen and Light (2000) conducted a small-scale E-mentoring program for adolescents with cerebral palsy. Four mentor-protégé dyads communicated weekly on topics relevant to the youths' disease. The results indicated that E-mentoring may be effective in easing the youths' minds; additionally, the frequency of message exchanges and opportunities for additional methods of contact were important steps in developing an effective E-mentoring program. Similarly, Shpigelman, Weiss, and Reiter (2008) conducted a 3-month E-mentoring intervention program designed to provide social and emotional support for protégés with disabilities by mentors who also have disabilities. Using a qualitative research design, findings provided support for the potential of electronic mentoring for personal development and empowerment of youth with special needs. Furthermore, the findings supported utility of the E-mentoring intervention as it created an accessible vehicle for relationship growth for people with special needs.

Unfortunately, there is a lack of research on E-mentoring for youth who have experienced a transplant; likewise, little has been documented on the models informing the various E-mentoring programs for youth with health challenges. Because of this lack of research, our study aims at providing a documented E-mentorship model supported by empirical evidence in the form of both quantitative and qualitative data. The next section will describe the context of the virtual world intervention in which E-mentorship was analyzed.

Rationale for the Virtual World Intervention

In the past, most young people needing organ transplants would not survive. Today, advances in medicine make it possible to extend the length of their lives. However, children are trading a life-limiting disease for invasive follow-up interventions and the hardships of medical adherence associated with difficulties in transitioning back to school and socially engaging with peers (Griffin & Elkin, 2001). Frequent clinic visits, medication intake, and for some, dietary and physical exercise restrictions for the rest of their lives can be disruptive to the patients' academic and social life (Brem et al., 1988; Erikson, 1950; Gerson, Furth, Neu, & Fivush, 2004; Rodin & Voshart, 1987). This problem gets exacerbated if we take into consideration that more than 60% of recipients aged 11 to 17 receive their transplants in medical centers that cater to adults where the needed

pediatric services for psychosocial support may not be available (Sweet et al., 2006).

Long-term studies that follow patients who have received a transplant in their childhood into adulthood are still few, but all emphasize the importance of psychosocial supports. Despite the hope of a greater quality and quantity of life, many adolescents who receive transplantation experience a surfacing of psychosocial problems throughout the process (Aley, 2002; Gerson, 2003; Todaro, Fennell, Sears, Rodrigue, & Roche, 2000).Therefore, it is crucial that help is provided to address the "medical, psychosocial, educational, and vocational" needs of the patients at various stages of their lives (Blum et al., 1993). Unfortunately, psychosocial services lag behind medical advances because it is difficult to run effective programs for transplant patients who are geographically dispersed and small in number compared with patients with other medical conditions.

Thus, there is a need to find other vehicles through which to provide the needed supports. This is the driving force at the core of the virtual world project described in this article. For the last 4 years, a pilot project using the Zora virtual world with youth aged 11 to 15 was run with pediatric transplant recipients, first at Children's Hospital Boston and then extending it to Tufts Medical Center (Bers, 2009; Bers et al., in press). The insights presented in this article about E-mentorship in virtual worlds are informed by the whole project, but only data from the last 4 months of the study are analyzed.

The Zora Virtual World

Zora is a multiuser graphical virtual world that provides a safe space for youth to explore issues of identity.[23] Zora was first designed in 1999 by Marina Bers for her doctoral research at the MIT Media Laboratory (Bers, 2001), and since then, it has been further expanded by Bers's Developmental Technologies Research group at Tufts University.

The Zora virtual world is designed on constructionist learning principles and the positive technological development framework that addresses the following 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).

Because Zora is a platform that allows the development of specific interventions for target populations, over the years, studies have been conducted with young people with end-stage renal disease undergoing dialysis treatment (Bers, Gonzalez-Heydrich, & DeMaso, 2003), multicultural groups (Bers, 2001), freshmen in college (Bers, 2008), participants in national and international after-school computer-based learning centers (Beals & Bers, 2009), and with posttransplant pediatric patients (Bers, 2009), who are the focus of this article. Zora is not an open world but a platform for educators and researchers to run their own projects in a safe and protected way.

In Zora, users are represented by a graphical avatar and can populate the virtual city by making their own virtual places and interactive creations, including 3D objects, characters, message boards, signs, movies, pictures, and sounds. They can write stories about their objects and assign personal or moral values to their creations as well as define those values in a collaborative values dictionary. The goal is to help users explore the meaning of objects and not just their functionality or aesthetic dimensions.

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 so as to afford participants a chance to self-reflect on their narratives, values, and stories.

In technical terms, the Zora platform consists of a 3D viewer of the virtual environment, a chat window, and a control browser (Figure 1). Users, represented as avatars of their choice, navigate the virtual space using arrow keys and a mouse. Likewise, chat bubbles are displayed on top of the avatar's head.

Zora enables the formation of a safe virtual community of peers in which participants engage in some of the key elements identified by Shapiro and Kocher (1996) for effective interventions for medical crises: the expression of emotion, working on relationships, examination of meaning, being involved in meaningful activity, seeking support from others with similar experiences, and medical proactivism in addressing these impediments.

The work presented in this article focuses on the role of E-mentorship in the Zora virtual world. Patients connect with other children in similar medical situations, from their homes or the hospital, and share their experiences with each other; E-mentors are available to run biweekly virtual sessions as well as participate in the experience when children come online. Graduate and undergraduate students with training in child life serve as E-mentors. Through a curriculum composed of creative virtual activities, E-mentors lead children in the exploration of strategies that might help them with medical adherence and coping. For example, they create a virtual pharmacy and populate it with games to learn about their medications

Figure 1. The Zora Platform including a 3D viewer, a chat window, and a control browser

and write stories in the Transplant House sharing their fears and fantasies. They also address other areas of children's concern, such as how to ease the transition to school. For example, they create a virtual school with objects and routines that will facilitate this process.

Study Description

The pilot Zora intervention with pediatric posttransplant recipients was run from September 2006 to December 2009. Within this period, 2 different virtual cities were created in 2 different phases of the project: (1) Zora City was a virtual world intervention for patients recruited at the Pediatric Transplant Center at Children's Hospital Boston (Bers, 2009); and (2) Camp Zora was a virtual world intervention for patients recruited from both Children's Hospital Boston and Tufts Floating Hospital for Children (Bers et al., in press). Although both phases informed our approach to E-mentorship, data presented in this article are collected from phase 2, the Camp Zora intervention.

Throughout the project there was "rolling" admission, and staff could recommend new participants at any point. Patients who did not have access to a computer or high-speed Internet connection were provided equipment for the duration of the program. Of the 70 patients who received consent forms, 24 consented to participate. Of the 24 who consented, 8 participated fully in the latest version of the program, which lasted from September 1, 2009, to December 8, 2009. The group represented a diverse range of transplants: there were 2 participants from the kidney program, 1 from lung, 1 from liver, 1 from heart, and 2 from bone marrow. Additionally, the group came from multiple areas of the country: 6 participants were from Massachusetts, 1 from New York, and 1 from Texas.

The group of 8 primary participants painted a picture of the struggles that adolescents with a transplant face on a daily basis. Throughout the program, multiple concerns were brought up by the participants and discussed during activities, including bullying, physical appearance, school organization, and pain management.

In terms of facilitators, 2 graduate students and 1 undergraduate student from the DevTech research group at Tufts University, with training in child life and pediatric psychology, led the biweekly curricular activities by instructing participants through the synchronous chat box located within the virtual world and visible to all participants. Facilitators, also called E-mentors, were trained in the mentorship model described in this article as well as in the psychosocial needs of youth who have received a transplant. E-mentors devoted their time to creating positive rapport with the participants and their families as well as in planning and implementing the curricular activities.

Curriculum: Camp Zora Activities

The Zora curriculum was designed to address issues of school transition and medical adherence through weekly online group activities created and run by the Camp Zora facilitators. Every Tuesday and Thursday of each week, for 14 weeks, a group activity was run starting at 6:00 PM. The activities were facilitated twice weekly to accommodate the schedules of the participants and provide multiple opportunities for the participants to complete them. Participants were guided by the facilitators to consider the week's theme and build objects and houses to contribute their ideas to the virtual community. Facilitators serve as mentors to the participants, offering them guidance and assistance while monitoring all online activity for safety. The activities were designed to build an online community, teach various technological skills, and facilitate the formation of a peer social and support network.

Many activities generated individual projects that facilitated discussion of curriculum themes using tools within Camp Zora. For example, building objects in *The Homework Help Cabin* served as a catalyst to launch conversations about school struggles and solutions; writing personal transplant stories in *The Transplant Experience Cabin* helped participants open up about their feelings; and creating virtual objects that could help with medical adherence in *The Smart Shop* involved children's imaginations as agents of their own well-being. The activities were mediums for the participants to express feelings, thoughts, and discuss difficult topics. For example, a 14-year-old male waiting for a kidney transplant contributed a virtual kidney to *The Smart Shop* and shared the following:

> I will be free. I won't have to be on a machine and I will be able to drink so much more and I will be

> able to play more sports it will be like a whole NEW life. It will be great.

Another participant, also a 14-year-old male, made a virtual alarm and put it in *The Smart Shop* explaining that it could help kids because "it tells you to take your medicine." The following excerpt from the Camp Zora chat logs provides a glimpse into the conversations surrounding *The Smart Shop*; here, the participants are discussing creating a robot that takes notes for you when you miss class because of medical issues:

Dave	o that would be good if ur sick cause then the robot could just give u all the notes and stuff
Kathleen	that's true it'd be great for when you're sick!
Kathleen	or if you had to go into the hospital
Dave	ya like me hopefully soon cause im active on the transplant list
Kathleen	we'll be keeping our fingers crossed Dave!
Megan	a robot that records all classes so you don't miss anything when you are out would be great
Kathleen	that's a great idea Megan!!

Other activities, such as the virtual scavenger hunt, established a collaborative activity between Camp Zora members. This culminating group activity had the dual purpose of carrying out a final reflection on the themes and collecting informal feedback on the participant's experiences in Camp Zora. Participants navigated through Camp Zora in search of clues from interactive characters and objects, which prompted them to reflect on the curriculum themes and build new objects to display the newly acquired technological skills. The following is an example from an interactive object found within *The Story House*:

> You found me! Now to get the next clue we must create a new interactive character that talks and walks. In the story box, give us all a clue about someone that has been helpful to you! Now for the next clue: Behind the Story House find the flower that has the power. The power to talk that is!

The clue asks the participants to create an interactive object, a technological skill set that was covered in the curriculum, as well as think about individuals who have provided assistance and support through their transplant experiences.

Research Question and Data Analysis Methods

This article addresses the research question, "What makes a successful E-mentorship model in virtual worlds for children with serious illnesses?" Past research on virtual communities for adolescents experiencing an illness have not explicitly addressed the aspects of E-mentoring that make a program successful.

To address this research question, 5 areas were explored to understand mentor patterns when facilitating a virtual community for adolescents with serious illnesses: time spent online, chat analysis, initiation of conversation, initiation of activities, and out-of-world contact.

All activity within the virtual world is logged in order to maintain records of what is built and to ensure safety. An online log provides opportunities for both qualitative and quantitative data. Qualitative data include transcriptions of all chatting that occurred within Camp Zora and the written descriptions of objects authored by the participants. Quantitative data include number of logins, time spent online, and the number of objects, characters, and virtual spaces created during the study. Qualitative data were derived using ethnographic methods where online chat transcriptions and out-of-world contact were analyzed using the systematic procedures of Walcott (1994), who called for finding patterned regularities in the data. Communication with participants and their families were coded for conversation direction and initiation, and activity initiation. During coding, patterns of initiation and direction arose and were compared with one another.

Camp Zora E-mentorship Model

The mentors within Camp Zora acted as the keystone to the virtual world because their efforts and time kept the community afloat. A mentoring relationship exists because one person is helping another person progress through life (Burlew, 1989). Within Camp Zora, mentorship rests heavily on the relationships established between mentor and participant; thus, activities within Camp Zora and participation rely on the bonds built and maintained by the mentors. DiRenzo, Linnehan, Shao, and Rosenburg (2010) reported that frequency of interaction between protégés and mentors influenced program outcomes of general self-efficacy and task efficacy. Likewise, Bierema and Merriam (2002) concluded that familiarity along with frequency were key determinants of successful mentorship projects. Additionally, in past projects, Bers (2008) reported on the significance of fostering and building the protégé–mentor relationship to create a safe, virtual environment for disclosure.

The mentorship model used during this program demanded that the mentor establish a strong relationship with the participant prior to initiating curricular activities, so that a foundation of trust was created. In fact, creation of role-modeling friendships were encouraged because "proteges often depict an effective mentor as a friend who provides important psychosocial support" (Ensher, Heun, & Blanchard, 2003 p. 269). The first 2 elements of the

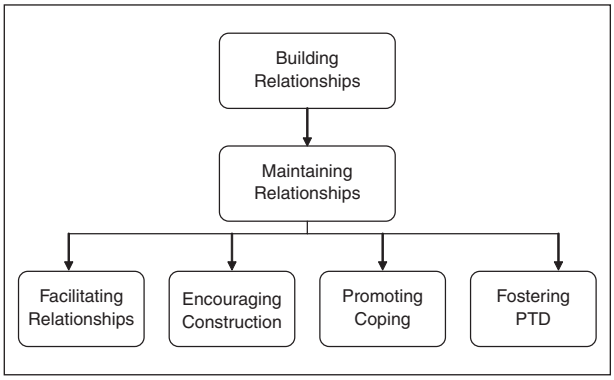

Figure 2. Camp Zora Mentorship Model

mentorship model require out-of-world communication, whereas the final 4 elements of the mentorship model are used within the virtual world, Camp Zora. As Figure 2 depicts, the model begins with building the relationships between mentor and participant. To facilitate this, each of the 3 mentors had their own case load to increase consistency and promote a stronger relationship. Additionally, many of the participants were met face-to-face by their mentor prior to consenting.

The second step within the model addresses the issue of maintaining relationships. This element required the most time and energy on the mentors' part. Throughout a single week with the Camp Zora project, mentors would contact participants multiple times to schedule interviews, confirm group session times, follow up on curriculum, and check in on important topics within the participants' lives, including school plays, history projects, team tryouts, and hospital visits.

Once relationships had been developed and maintained, the mentor would begin contributing to the other 4 elements of the mentorship model within the virtual world. Time on Camp Zora was split between facilitating peer-to-peer friendships (to instigate community growth), encouraging construction of curricular activities, promoting coping through discussion of health-related issues, and fostering positive technological development by providing participants with an arena to develop technical skills.

Results

This section presents results regarding the 5 areas of interest for understanding the role of E-mentorship in these kinds of interventions: time spent online, chat analysis, initiation of conversation, initiation of activities, and out-of-world contact. But first, an overall sense of the participant activity is provided.

In terms of Zora activity logs, a world of objects, houses, and characters have been created in the virtual space by the pediatric transplant recipients; altogether, during the 4 months of the intervention, participants built more than 450 objects, 23 houses, and 19 characters, wrote 22 values for their objects and defined them, and created 20 stories. They also engaged in synchronous online conversation and produced 25 463 lines of chat. Participants engaged in conversations addressing medical adherence, school transition, peer relationships, time management, and extracurricular activities. E-mentors spent time and energy creating an environment that would promote positive social support; the following excerpt is a glimpse into the support offered through the program:

Catie	Kathleen I have big news!!
Kathleen	oooo- tell!!!
Catie	ok so I'm writing a book I have a good chance of getting it published!!
Allie	that's amazing
Catie	ya ik
Kathleen	what is it about???
Kathleen	tell us more!!!
Catie	well see I'm on the 22nd chapter and I don't have a title yet
Catie	It's a mystery book

Time Spent Online

Time spent online addresses the research question by clarifying the amount of time that mentors and participants devote to the growth and development of the virtual world.

When observing time spent online, Table 1 depicts the patterns of usage by participants. The table also describes patterns of absence within use such as Kathy's drop-off after October and Dave's decrease in November, the month of his surgery. Additionally, the table notes that time spent online during December is considerably lower than in other months, a result of the project closing after the first week (December 8).

When looking at the overall time spent online, one is able to note that 62% of minutes online are credited to the mentors, despite the mentors accounting for only 3 individuals. These numbers are a result of the many hours spent preparing the virtual world for future activities and building examples. Most participants came online once a week to engage in the activities previously prepared by mentors. Mentors, though, were online for multiple sessions during a week to provide alternate opportunities for the participants to complete the activities and to provide counsel and support on an individual basis.

Direction of Conversation

Although the information presented above highlights the strong presence of mentors in the virtual world, it is

Table 1. Total Minutes Spent Online by Users (September 1 to December 8)

	Participants (n = 8)								Mentors (n = 3)		
	Catie	Megan	Dave	Johnny	James	Kathy	Diamond	Tiffany	Kelly	Kathleen	Allie
September	103	87	38	176	0	58	134	70	357	475	102
October	63	93	101	158	0	36	142	78	492	570	219
November	31	14	28	345	202	0	90	90	452	307	157
December	118	39	48	57	0	0	60	0	235	174	103
Total	315	233	215	736	202	94	426	238	1536	1526	581
Monthly average	78.75	58.25	53.75	184	50.5	23.5	106.5	59.5	384	381.5	145.25

Table 2. Total Direction of Dialogue (September 1 to December 8)

	Participant Dialogue		Mentor Dialogue	
	Participant Directed	Mentor Directed	Participant Directed	Mentor Directed
Segments of chat	392	3059	5416	811
Percentage of chat	13	87	85	15

Table 3. Direction of Dialogue Across Curriculum (September 1 to December 8)

	Participant Dialogue		Mentor Dialogue	
	Percentage Participant Directed[a]	Percentage Mentor Directed	Percentage Participant Directed	Percentage Mentor Directed
Week 1	0	100	99	1
Week 2	17	83	98	2
Week 3	12	88	95	5
Week 4	19	81	94	6
Week 5	0	100	74	26
Week 6	2	98	58	42
Week 7	16	84	82	18
Week 8	3	97	93	7
Week 9	14	86	94	6
Week 10	0	100	87	13
Week 11	15	85	97	3
Week 12	11	89	76	24
Week 13	16	84	91	9
Week 14	16	84	74	26

[a]Percentage of segments of chat within Camp Zora logs.

useful to also understand how the mentor contributes to the conversations within the virtual community (Table 2). Segments of chat extracted from conversations within Camp Zora logs demonstrate that participants were more inclined to speak with mentors (87%) rather than peers (13%). Additionally, direction of chat within the logs also reveals that mentors were more likely to direct their chat toward participants (85%) rather than fellow mentors (15%).

When observing chat direction week by week, the pattern remains throughout the curriculum period with participants directing at least 80% of their statements toward mentors. In addition, despite encouraging participants to work together, the percentage of chat directed toward other participants did not demonstrate a significant increase as the program progressed. With the exception of 1 week, mentor dialogue was consistently directed toward participants at least 70% of the time and also did not demonstrate a significant variance (Table 3).

Many times, participants would come online and chat with their favorite mentor and not acknowledge the other participants or mentors within the virtual world; thus, multiple conversations would take place. Although the chat was synchronous, many of the conversations were held one-on-one, within separate virtual rooms. For example, although the following chat excerpt depicts 2 conversations

occurring simultaneously, Kelly and Tiffany are in a separate virtual room from Dave and Allie:

Kelly	Tiffany do you see me?
Kelly	where are you standing?
Allie	so dave what do you think . . . do you want to make a conversation for your object
Tiffany	I don't now im by head corers
Dave	u mean my pic
Allie	Yup
Dave	Sure y not
Kelly	found ye-
Kelly	do you see me then Tiffany?
Tiffany	No
Allie	so lets make a conversation that talks about how your family helped you

Additionally, when mentors are online with multiple participants in the same virtual room, it is often difficult to keep up with the different conversations. To aid in the various conversations, chat balloons appear above an avatar's head whenever the chat is entered, making it easier for the conversation to be followed. Despite the aid of the balloons, mentors still require skills in multitasking; for example, the excerpt below highlights the nature of many mentor-led conversations:

Kathleen	Oh no! why have you been sick Dave?
Kathleen	Johnny how was your birthday party?
Johnny	it was fun
Dave	well i think i got a cough from my bro so ive beenout of school lately
Kathleen	what did you do at your party Johnny?
Kathleen	Does your brother still have the cough Dave?
Dave	yes but were both getting over it now
Johnny	We just played games had some food and talked
Kathleen	that's good to hear Dave I hope you feel better soon!
Kathleen	that's great Johnny . . . did you eat pizza? i'm totally craving pizza tonight!

Initiation of Conversation

Understanding who initiates conversation also contributes to the research question by describing how the mentors act as leaders or followers of the online conversations. A total of 157 initiation statements were made in the Camp Zora logs to begin conversation. Of the 157 statements, 41 (26%) were made by participants and 116 (74%) were made by mentors, demonstrating that mentors were more likely than participants to start dialogue (Table 4).

Table 4. Conversation Initiations Across Curriculum (September 1 to December 8)

	Participant Initiated	Mentor Initiated
Week 1	1	4
Week 2	6	8
Week 3	1	7
Week 4	4	4
Week 5	1	6
Week 6	2	8
Week 7	4	10
Week 8	2	6
Week 9	6	12
Week 10	2	6
Week 11	3	10
Week 12	1	8
Week 13	3	13
Week 14	5	14
Total	41	116
Total	26%	74%

Of the 41 conversations initiated by participants, 12 were directed toward other participants (29%), and 29 were directed toward mentors (71%), indicating that participants who initiated conversation were more likely to direct their opening statement toward mentors. Likewise, of the 116 conversations initiated by mentors, 79 (68%) were directed toward participants, and 37 (32%) were directed toward other mentors (Table 5).

Typically, when participants would log online, the mentor would initiate the conversation after seeing the avatar appear in the virtual world. It was rare that a participant would address the mentors first; for example, the following excerpt from the Camp Zora chat logs demonstrates how mentors would welcome the participant into Camp Zora whenever their avatar appeared:

Kelly	I see Dave
Allie	yeah
Allie	hi dave!
Dave	yeaaa im here

Initiation of Activities

In addition to initiating conversations online, mentors also act as the leader initiating activities. Given that the mentors play an important role in developing Camp Zora activities to meet the needs and interests of the participating children, their prominent role in initiating them online is not surprising. Logs convey that 78% of statements used to initiate an activity were led by mentors, and 22% were led by participants. Similarly, logs demonstrate that

Table 5. Direction of Conversation Initiations

	Participant Initiated		Mentor Initiated	
	Participant Directed	Mentor Directed	Participant Directed	Mentor Directed
Total	12	29	79	37
Percentage	29%	71%	68%	32%

Table 6. Activities Initiated Across Curriculum (September 1 to December 8)

	Participant Initiated	Mentor Initiated
Week 1	1	2
Week 2	3	1
Week 3	0	0
Week 4	2	5
Week 5	1	4
Week 6	0	3
Week 7	3	8
Week 8	0	11
Week 9	3	6
Week 10	1	4
Week 11	3	11
Week 12	0	2
Week 13	1	3
Week 14	0	3
Total	18	63
Total (%)	22%	78%

as the curriculum progressed, the amount of activities initiated by mentors per week increased slightly; despite this, the number of activities initiated by participants did not vary. For example, participants initiated more noncurricular activities such as decorating cabins with photographs of their favorite actors while mentors initiated curricular activities such as constructing objects to aid in school transition (Table 6).

Logs also demonstrate that participants are more likely to initiate activities that do not directly relate to the curricular goal of using Camp Zora to promote medical adherence and support in the school transition process. For example, participants would initiate activities such as constructing recreational buildings like the Halloween Fun House and decorating their individual cabins. Of the 18 activities initiated by participants, 13 (72%) were unrelated to the curriculum. Additionally, logs demonstrate that mentors are more likely to initiate activities within the curriculum. Of the 63 activities initiated by mentors, 58 (92%) pertained to the curriculum. Eight of the 18 activities (44%) initiated by participants were related to building objects unrelated to the curriculum such as decorating personal cabins with pictures, furniture, and media. This trend continues as 26 of the 63 activities (41%) initiated by mentors were related to building objects related to the curriculum such as objects to aid with medication adherence, school organization, and time management.

The following excerpt describes an exception to the numbers and an instance in which a participant initiated an activity; the activity initiated by Catie, though, as described by the data, is not related to the curriculum:

Catie	I'm goin to name it Halloween Fun House instead so we can share other ideas for Halloween
Kelly	Great!!
Kathleen	yippee!
Catie	Ok
Kelly	and can you add the description to it too to invite others for that same idea
Catie	I said come on in and experience Halloween
Kelly	Ok-
Catie	I'll make a sign 4 outside
Kelly	Gr8
Kelly	woo you are being creative

Out-of-World Contact

The mentorship model used within this project required that the mentors devote time to developing and maintaining relationships with the participants; likewise, much of the relationship growth occurred outside of the virtual world. Thus, understanding the amount of out-of-world contact that goes into the facilitation of the program is very important to answering the research question. Table 7 breaks down the various types of contact and the initiating party. A total of 25% of out-of-world contact is made by the mentor to the parents of participants. Likewise, the contact received by the participating families is split between parents (22%) and participants (21%).

Table 8 describes the various reasons for contacting individuals within the Camp Zora program. The table shows that 37% of contact made by mentors had the purpose of updating members within the program of various events taking place within the world. Similarly, a majority of contact received by mentors is split between social (29%) and scheduling (29%) purposes.

Table 7. Types of Out-of-World Contact by Initiating Party

	Sent by Mentor to				Received by Mentor From			
Format	Participant	Parent	Hospital Staff	Teacher	Participant	Parent	Hospital Staff	Teacher
Email	27	49	13	5	34	59	6	5
Phone call/Text	2	17	2	3	41	19	1	4
Letter	24	24	18	0	0	0	0	0
Meeting	6	6	2	0	6	6	2	0
Totals	59	96	35	8	81	84	9	9
Percentage	15	25	9	2	21	22	2	2

Table 8. Reasons for Contact

		Reasons for Contact				
	Format	Reminders	Scheduling	Updates	Social	Interviews
Sent by mentor	Emails	34	53	8	3	0
	Phone calls/Text	0	10	0	0	14
	Letter	0	0	66	0	0
	Meeting	0	0	0	0	14
	Total (%)	17	31	37	1	14
Received by mentor	Emails	41	29	0	23	11
	Phone calls/Texts	1	21	0	27	16
	Letter	0	0	0	0	0
	Meeting	0	0	0	0	14
	Total (%)	24	29	0	29	18

Conclusions

The experience presented in this article shows the importance of the role of E-mentors for engaging participants in a virtual world intervention with psychoeducational goals. In sum, this article demonstrates the major role the E-mentor plays in maintaining the virtual community through (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.

In experiences with virtual worlds such as the one described here, the role of E-mentors involves attention to both out-of-world and in-world communication and rapport building. However, the role of E-mentors also needs to be analyzed in the context of children's motivation to participate online, the severity of their health condition at the time of the intervention, the amount of technical help needed by the participants to set up the virtual world, and the competing activities that children engage in during after-school time.

To be successful in their task of building rapport with participants and their families, E-mentors benefit from having different sets of skills and experience: (1) expertise in participating and running psychosocial group interventions (eg, support groups, educational after-school activities, camp counseling, etc), (2) experience participating in online experiences, and (3) experience communicating and multitasking through virtual resources such as chatting and emailing.

Most important, E-mentors play a powerful role in the lives of youth who have had a transplant and, thus, must remain sensitive to the youth's emotional safety. The success of the relationship depends on the consistency and investment of time by the E-mentor. Without this dedication, the relationship cannot maintain the foundation and safety needed to support positive psychosocial development.

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References

Aley, K. (2002). Developmental approach to pediatric transplantation. *Progress in Transplantation, 12,* 86-91.

Association of Virtual Worlds. 2008, August. The blue book: A consumer guide to virtual worlds. http://www.associationofvirtualworlds.com/publishing_blue_book.php (accessed February 10, 2009).

Barak, A., Hen, L., Boniel-Nissim, M., & Shapira, N. (2008). A comprehensive review and a meta-analysis of the effectiveness of Internet-based psychotherapeutic interventions. *Journal of Technology in Human Services, 26,* 109-160.

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.

Bers, M. U. (2001). Identity construction environments: Developing personal and moral values through the design of a virtual city. *The Journal of the Learning Sciences, 10,* 365-415.

Bers, M. U. (2006). The role of new technologies to foster positive youth development. *Applied Developmental Science, 10,* 200-219.

Bers, M. U. (2008). Civic identities, online technologies: From designing civic curriculum to supporting civic experiences. Civic life online: Learning how digital media can engage youth. In W. L. Bennett (Ed.), *The John D. and Catherine T. Macarthur Foundations Series on Digital Media and Learning* (pp. 139-160). Cambridge, MA: MIT Press.

Bers, M. U. (2009). New media for new organs: a virtual community for pediatric post-transplant patients. *Convergence: The Journal of Research Into New Media Technologies, 15,* 462-469.

Bers, M., Beals, L., Chau, C., Satoh, K., Blume, B., DeMaso, D., & Gonzalez-Heydrich, J. (2010). Use of a virtual community as a psychosocial support system in pediatric transplantation. *Pediatric Transplantation, 14*, 261-267.

Bers, M. U., Gonzalez-Heydrich, G., & DeMaso, D. (2003). Use of a computer based application in a pediatric hemodialysis unit: a pilot study. *Journal of the American Academy of Child and Adolescent Psychiatry, 42,* 493-496.

Bierema, L., & Merriam, S. (2002). E-mentoring: Using computer mediated communication to enhance the mentoring process. *Innovative Higher Education, 26,* 211-227.

Brem, A., Brem, F., McGrath, M., & Spirito, A. (1988). Psychosocial characteristics and coping skills in children maintained on chronic dialysis. *Pediatric Nephrology, 2*(4), 460-465.

Burlew, L. D. (1989) Mentoring: Middle-aged professionals may not be prepared. *AADA Newsletter, 3*(2), 6.

Bush, J. P., Huchital, J. R., & Simonian, S. J. (2002). An introduction to program and research initiatives of the STARBRIGHT foundation. *Children's Health Care, 31,* 1-10.

Cohen, K. J., & Light, J. C. (2000). Use of electronic communication to develop mentor–protégé relationships between adolescent and adult AAC users: Pilot study. *Augmentative and Alternative Communication, 16,* 227-238.

DeMaso D. R., Twente A. W., Spratt E. V., O'Brien P. (1995) Impact of psychological functioning, medical severity and family functioning in pediatric heart transplantation. *The Journal of Heart and Lung Transplantation* 14:1102-1108.

DiRenzo, M., Linnehan, F., Shao, P., Rosenberg, W. (2010). A moderated mediation model of ementoring. *Journal of Vocational Behavior, 76,* 292-305.

DuBois, D. L., Holloway, B. E., Valentine, J. C., & Cooper, H. (2002). Effectiveness of mentoring programs for youth: A meta-analytic review. *American Journal of Community Psychology, 30,* 157-197.

DuBois, D. L., & Karcher, M. J. (2005). Youth mentoring. In D. L. DuBois & M. J. Karcher (Eds.), *Handbook of youth mentoring* (pp. 2-11). Thousand Oaks, CA: Sage.

DuBois, D. L., & Silverthorn, N. (2005). Natural mentoring relationships and adolescent health: Evidence from a national study. *American Journal of Public Health, 95,* 518-524.

Ensher, E., Heun, C., & Blanchard, A. (2003). Online mentoring and computer-mediated communication: New directions in research. *Journal of Vocational Behavior, 63,* 264-288.

Erikson, E. (1950). Childhood and Society. New York: W.W. Norton.

Gerson, A. C., Furth, S. L., Neu, A. M., & Fivush, B. A. (2004). Assessing associations between medication adherence and potentially modifiable psychosocial variables in pediatric kidney transplant recipients and their families. *Pediatric Transplantation, 8,* 543-550.

Griffin, K. J., Elkin, T. D. (2001) Non-adherence in pediatric transplantation: A review of the existing literature. *Pediatric Transplantation 5*(4):246-9.

Lieberman, D. A. (2001). Management of chronic pediatric diseases with interactive health games: Theory and research findings. *Journal of Ambulatory Care Management, 24,* 26-38.

Rodin, G., & Voshart, K. (1987). Depressive symptoms and functional impairment in the medically ill. *General Hospital Psychiatry, 9*, 251-258.

Rousso, H. (2001). What do Frida Kahlo, Wilma Mankiller, and Harriet Tubman have in common? Providing role models for girls with (and without) disabilities. In H. Rousso & M. Wehmeyer (Eds.), *Double jeopardy: Addressing gender equity in special education* (pp. 337-360). Albany: State University of New York Press.

Sanchez, R. J., Bauer, T. N., & Paronto, M. E. (2006). Peer-mentoring freshmen: Implications for satisfaction, commitment, and retention to graduation. *Academy of Management Learning and Education, 5*(1), 25-37.

Schneider, S. M., & Workman, M. L. (2000). Virtual reality as a distraction. Intervention for older children receiving chemotherapy. *Pediatric Nursing, 26,* 593-597.

Shapiro, D., & Koocher, G. (1996). Goals and practical considerations in outpatient medical crisis intervention. *Professional Psychology: Research and Practice, 27*, 109-120.

Shpigelman, C., Weiss, P., & Reiter, S. (2009). E-mentoring for all. *Computers in Human Behavior, 25,* 919-928.

Smith-Jentsch, K., Scielzo, S., Yarborough, C., & Rosopa, P. (2008). A comparison of face-to-face and electronic peer-mentoring: Interactions with mentor gender. *Journal of Vocational Behavior, 72,* 193-206.

Todaro, J., Fennell, E., Sears, S., Rodrigue, J., & Roche, A. (2000). Review: Cognitive and psychological outcomes in pediatric heart transplantation. *Journal of Pediatric Psychology, 25,* 567-576.

Walcott, H. F. (1994). *Transforming Qualitative Data: Description, Analysis, and Interpretation*. Thousand Oaks, CA: Sage.

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