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ABSTRACT

This case study describes the Internet correspondence using MOO, a multiuser, object-oriented site, that was developed between six third-grade girls and TCC, an adult with blindness. The changes from the students' original attitudes toward blindness, that blindness posed a barrier to communication and relationship-building, into their acceptance that blindness is a different way of living in the world, is described. Three stages of the students' growing understanding of blindness and ability/disability are described: (1) their first encounters with blindness in the context of having to develop new types of reading and writing skills for the electronic mail exchange; (2) their growing awareness of social and practical differences between the lives of the blind and the sighted as they developed their technical Internet skills; and (3) their focused explorations of the experience of blindness off-line and their creative transfer of that learning to other social contexts and understanding of disability. Results indicate that: (1) the Internet can provide valuable contexts for skill and knowledge development at the elementary school level and (2) the Internet is conducive to building interpersonal relationships because it masks social differences, while at the same time it can facilitate greater understanding of social differences. (CR)

Difference Blindness/Blindness Difference: Student Explorations of "Disability" over the Internet

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Abstract

In this paper, Internet communication is discussed as a forum for elementary school students to investigate social differences. Inasmuch as Internet users are virtually "bodiless," and have the power to conceal and disclose information about their "In Physical Life" identities selectively, discrimination and stereotyping on the basis of race, gender, age, or physical differences (among other ascriptive identity categories) are potentially avoidable social practices on the Net. For many educators, this image of virtual equality on the Internet is a seductive one. However, the Internet also provides the opportunity for students to learn about the diverse experiences of others in a relatively neutral social space. As an example of this second type of Internet interaction, this case study focuses on the E-mail communication between a group of six third grade girls in an urban elementary school and their blind adult "keypal". Drawing on data from interviews, field notes, and E-mail correspondence, the authors consider the ways in which the "difference blindness" of the Internet has given way to the students' frank exploration of the difference *of* blindness.

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Introduction

In the explosion of recent commentary on the development of the Internet, on-line communication and information access are increasingly heralded as panaceas for the social divisions and inequalities which plague public education in the United States. As President Clinton stated in a speech he made in Sioux Falls, SD, on November 4, 1996:

> *We are working hard to connect every classroom and every library in every school in America to the Information Superhighway by the year 2000. And here's what it means. It means that children in every American tribe in America, children in the poorest rural school districts, children in the most remote districts in Alaska, children in the biggest -- poor inner-city school districts in our biggest cities, children in urban, suburban and rural districts, rich, poor, middle class -- for the first time in the history of America, because of these connections we can make available the same learning from all over the world at the same level of quality and the same time to all of our children. It will revolutionize education.*

There is much enthusiasm for the potential educational benefits which may be derived from this "virtual equality" found on the Internet. Arguments on behalf of school-based Internetworking identify benefits which tend to fall into one of three main categories:

(1) student access to a wide range of information resources;
(2) opportunities for students to become information resources themselves, and;
(3) opportunities for students to interact with individuals of different experiential backgrounds.

In both popular and scholarly literature on the educational uses of the Internet (Riel 1992; Spaulding and Lake 1991; Turkle 1995) and in discussions among teachers and school administrators, one issue is raised repeatedly as an important contributing factor in fostering relationships on the Internet (the third category of educational benefit). We have termed this factor "difference blindness." On the Internet, users do not encounter the same kinds of information about each other that they inevitably do in face to face situations (Sproull and Kiesler,

1993). In fact, they can can represent themselves as ageless, raceless, genderless, and potentially, bodiless, if they so choose. Moreover, they are able to construct new and shifting identities or "characters" when they communicate with others. This "difference-blind" characteristic of Internet communication, and the relative anonymity it affords to users, is often thought to facilitate interactions across social borders which are based on physical identity markers. In this sense, Internet access is conceived of as not only opening windows onto the world, but as creating new pathways for social interaction.

The following case study explores this theme of relationship building over the Internet. In the learning situation that is described, the "difference blindness" of the Internet was used as a vehicle to raverse social borders based on identity markers, but not to evade differences. The study focuses on the Internet correspondence between six third grade girls and their long-term Internet "keypal", TCC. The girls who are the main subjects of this case study "met" TCC when he responded to one of their messages, or "posts", in a virtual interaction environment called a MOO (described later in this paper).. TCC, it turned out, was a blind adult Internet user who lived a continent away from them.

Over the Internet, the students slowly developed a strong friendship with TCC, by learning about his way of life and sharing their own experiences with him. The introduction to TCC's world via the Internet furnished a concrete context for the students, with the guidance of their teacher-librarian, to learn and to think critically about blindness, disability, and social differences generally. In addition, the students' curiosity about TCC and their desire for his friendship strongly motivated them to learn important elements of interpersonal communication, and to practice these skills in their reading, writing, and Internetworking activities.

The case study traces the development of the students' understanding of TCC's blindness, from their original sense that his blindness posed a barrier to communication and relationship-building which they would have to overcome, to their conceptualization of blindness as a different way of living in the world which they sought to explore. We begin with a brief overview of the research methods used in this case study. Next we present a more detailed description of the physical and on-line settings and circumstances in which this activity took place. Then we turn to consider three stages in the students' growing understanding of TCC's world: (1) their first encounters with blindness, in the context of developing reading and writing skills for the E-mail exchange; (2) their growing awareness of social and practical differences between the lives of the blind and the sighted, in the context of developing their technical Internetworking skills; and (3) their focused explorations of the experience of blindness off-line, and their creative transfer of that learning to other social contexts.

Methods of Inquiry

Data for this study were drawn from detailed, qualitative observations of classroom activities, semi-structured interviews, and collected archival material, including the contents of E-mail exchanges between the students and TCC. Trained observers used the "full field note" method of data collection (Olson 1976) which involves taking extensive handwritten notes during the events being observed. Care was taken to make the field notes as factual and as concretely descriptive as possible. For example, instead of or in addition to saying that a student reacted positively or negatively to reading a letter on the computer, we recorded behavioral manifestations of this internal state such as smiling or clapping. All field notes

were audiotaped, transcribed and then coded for content, using established qualitative methods such as those outlined in Strauss and Corbin (1990) and Miles and Huberman (1984). We paid careful attention to causing as little disturbance in the classroom as possible, presenting ourselves as researchers who were interested in learning about factors which promote and inhibit use of the Internet as a curriculum and professional development resource. In addition, we emphasized the fact that the information we gathered would be treated confidentially. To ensure this confidentiality, pseudonyms have been used to identify all people, institutions, and geographical and on-line locations mentioned in this paper.

Because interviews are particularly useful for providing participants' perspectives on events, at the end of the school year we conducted lengthy (at least one hour in duration) interviews with each of the students, the teacher-librarian, and later with TCC as well. Follow-up interviews with the teacher and, via E-mail, with TCC, were conducted during the course of writing this paper. Interviewers worked from carefully designed sets of open-ended questions, but were encouraged to probe respondents' replies extensively and to follow up on topics which those being interviewed suggested were important even if they were not part of the prepared set of questions. In constructing and conducting interviews, strong efforts were made to procure valid and unbiased data. For example, questions were posed in a balanced manner so that leading questions were avoided, and we made frequent checks to ensure that the students completely comprehended the questions that we posed. The audiotaped interviews were transcribed and coded according to the same methods applied to the field notes for identifying predominant themes and issues that emerged in the data.

Archival materials, specifically E-mail, are another important source of information used in this research. With participants' permission (as well as parental permission for the students involved), the teacher-librarian forwarded nearly all E-mail interactions which took

place between the students and TCC. These data were also analyzed according to standard qualitative methods outlined in sources such as Strauss and Corbin (1990) and Lofland and Lofland (1995).

The Setting, In Physical Life

Independence Elementary School is a 90 year old stone oblong nestled between rose gardens in a white professional neighborhood, in a mid-sized city of the North East United States. This city is sliced into sectors by the natural topography of rivers and mountains, and by relatively rigid racial and ethnic divisions that have characterized social organization here since the turn of the century. These social borders are inscribed on the urban landscape through its distinctive culture of neighborhoods -- self-contained and socially homogenous enclaves where, at least until recently, residents of the city often spent their entire lives.

Tucked behind the upscale boutiques which line the neighborhood's main street, Independence on first glance seems an unlikely place to look for experiments in crossing social borders. Yet, the school has proven something of a success story in this regard, having established itself in the mid 1980s as one of the district's three elementary level Spanish-language magnets and, more recently, as an "international studies" site, mandated to provide a curriculum that refers students' attention "beyond the school to the community and the world." In addition, desegregation policies in the school district have resulted in the school achieving a student population that is 52% African American, and 47% White and other races. The school boasts a cadre of innovative teachers, and a principal who has provided them the autonomy to

plan and implement both individual and school-wide changes in teaching practices and curricular projects . As one teacher remarked in a June 1996 interview,

> *"We have much more of a 'give us a project, we'll get it done'*[attitude.] *Give us the space and we'll get that project done and three more.*

Independence went on-line in the autumn of 1994, as a result of its involvement in a National Science Foundation-sponsored research project to study potential uses of the Internet in schools. District schools were selected to participate in this study on the basis of curriculum proposals written collaboratively by their teachers. The Independence proposal, submitted by the eight teachers comprising the Independence "Internet Team," was framed around the issue of global communication, and hinged on the conceptualization of Independence as an "international studies" school. In their proposal, the Net Team explained,

> *We see the network as a realistic means to actually contact that "world" which we have been studying within the limitations of our physical space. One of our basic goals is to move the ideas acquired through the interpersonal communications of the classroom and the school beyond the walls into the broader community of the school district, the state, the country, the world. We believe that internationalization means global communication and, as such, we see the Internet being used as an instrument:*
>
> 1. *To gather data (both by teachers and students)*
> 2. *To develop personal contacts for further data collection*
> 3. *To share what we do at Independence with and to learn from others.*

The proposal also assigned a key role to the school librarian, Ms. Ebert, in the institutionalization of the Internet as a research tool and information resource at Independence:

> *The library will be a center for investigative research based on questions arising from class activities. The librarian will act as facilitator, and the library will act as the hub for all of the school network activities.*

To support this project, the principal provided Ms. Ebert with two free periods per week during which to conduct Internet activities with students. In keeping with the general process

outlined in the Net Team's proposal, Ms. Ebert's goal was to develop Internetworking proficiency in a small number of students who would in turn train other students in their respective classrooms. To this end, Ms. Ebert initiated an on-line reading and writing activity which the students completed in the context of an Internet MOO (described below). Ten student volunteers were excused from their regular third grade classes to participate in this Internetworking activity in the library. The case study presented here describes the activities of the six female students whose MOO work increasingly came to focus on interacting with TCC.

The Setting, In Virtual Life

'MOO' is an acronym for *'multiuser, object oriented'*. MOOs are Internet environments where multiple individuals can log on simultaneously in order to interact with one another or to 'use' the various 'objects' (e.g. texts, pictures, soundbits, bulletin boards, etc.) which programmers create and maintain for the MOO. Since many programmers can create and add objects to a MOO at the same time, each MOO is moderated by a MOO "Wizard," who screens additions to the MOO for thematic relevance, appropriate language, and so forth. Originally, MOOs were developed primarily for computer-based adventure and role-play gaming (hence the term, "Wizard"). Today there are a growing number of MOOs which, like the MOO frequented by the Independence students, are devoted to educational activities and skill-building like reading and writing.

Ms. Ebert's initial plan for using the MOO was to create a virtual environment where her students would be encouraged to read stories, to respond to what they had read, and

eventually to post stories or poems of their own. To do so, she taught herself the programming language for building "rooms" and text-based "objects" at a pre-existing, educational MOO. To make the MOO more appealing to young children, she incorporated ASCII artwork (images, sometimes called "line drawings" or "cave paintings" composed of different configurations of ASCII characters) in the stories that she transcribed for her MOO rooms.

In December 1995, Ms. Ebert was reprimanded by the MOO "Wizard" for incorporating the ASCII "drawings" in her reading rooms, since the artwork is not accessible to visually challenged users who rely on voice synthesizers to navigate the Internet. Since the MOO where she had built her rooms was specifically identified as a "diversity-friendly" environment that encouraged visits from users with special needs, the inaccessible artwork had to be removed. Ms. Ebert apologized in a public post to other builders at the MOO. She requested advice as to how she might convert her rooms to make them more accessible, but suggested that such a task might prove unwieldy. It was more likely, she anticipated, that she would have to destroy her work and quit the MOO: *"All I see to do is to @recycle everything and leave".*

This post drew immediate response from several blind users who urged her not to destroy her work on the MOO, but instead to explore ways to make her future projects accessible. One respondent, TCC, wrote,

> *I have not yet taken a 'look' (listen?) At your projects yet, but I'm sure they are very valuable, and I don't think that '@recycle' and leave is an acceptable way of thinking ... Please! Get rid of any thoughts of leaving just because of this sudden awareness you yourself are gaining. This is an educational environment ... The idea is learning. So help us all learn, including yourself. Stick with us,*

okay? ... If you've done all you can to understand what's happening and we aren't helping you, then something needs to be changed at a more fundamental level, so get in here and help us figure out what it is needs changing ...

Galvanized by this response and others similar to it, Ms. Ebert forged ahead with her plans for her reading rooms, but now with a heightened consciousness toward issues of access for blind users. Our December 1995 field notes record Ms. Ebert making changes to her rooms to make them more accessible to blind users. For example, she had originally created a graphic in the shape of a key, inside of which was the line of text, *"Reading is the key to life"*. Later she separated the graphic from the text, and added text that a blind user would be able to read: *"you see a big wooden door. Do you wonder what's inside? Reading is the key that unlocks all doors"*.

The Keypals

In January 1996, Ms. Ebert helped the students to post information on the MOO bulletin board about a school-wide activity at Independence: "Stuffed Animal Day". The students were surprised and delighted when TCC (who had continued to correspond with Ms. Ebert and tutored her on use of the MOO) responded to their post with a brief description of his own stuffed toy. With Ms. Ebert's encouragement, the students sent him their first tentative letters. In the interview excerpt below, Ms. Ebert describes how the girls took the initiative to respond to TCC, the first person outside of Independence to interact with them at the MOO:

As for the group of kids who do E-mail like with TCC ... you know, I don't ... it was the girls who volunteered ... you know, like he posted to Stuffed Animal Day. We had a stuffed animal board. You were supposed to go and tell about

a stuffed animal and so he told about one someone had given him in eighth grade. And a couple of the girls said "Wait, who is this person? Can we write to him?" And I said, "Anybody who wants to can write to him".

Thus began a weekly MOO-mail , E-mail and "snail mail" (traditional US Postal Service) correspondence between the girls and TCC. We have described above the unique potential for correspondents to mask their "IPL" ("In Physical Life") identities when interacting with others via the Internet. This capacity for "difference blindness" is especially pronounced in MOO environments which often encourage users to redefine their identities by adopting "character" names and by engaging in role-play activities with other users. This distinctive feature of MOO culture is reflected in the E-mail excerpts presented in this paper, where TCC's letters to the girls are addressed to the character name they adopted, "Ollie". In such a situation, it would have been relatively easy for TCC to conceal from the girls the fact that he was blind. Instead, in his responses to their first letters, TCC was quite open about this aspect of his "IPL" experience which differed from their own.

In interviews conducted near the end of the school year, after corresponding with TCC for five months, several of the girls reflected upon their initial hesitation and concern about interacting with a person whom they had discovered to be blind. In the interview excerpts below, Samantha and Sarah respectively describe their early attitudes toward TCC:

I: Have your impressions of TCC changed over time?
I: Yes.
R: In what way?
R: Well, when I first met TCC I wasn't too sure I was going to enjoy ... a blind person ...
***
I: Have your impressions about TCC changed over time?
R: Yes ... because ... my impression of him was he was a blind person, he didn't know how to do most things ...

Ms. Ebert also recognized the girls' initial discomfort with TCC's blindness. Below she describes her rationale for encouraging the correspondence with him:

> *You know, in the beginning they were overwhelmed by blind. "He's blind. Okay, toss it away. He can't see anything, so how could he do this and how could he do that?" And I wanted them to learn that yeah, there were other ways to do it .... the more you can learn, the better person you are. And school ... our textbooks do limit what kids learn, you know?* ... [The Internet correspondence with TCC] *is true enrichment, you know. It's not enrichment in that, "We'll give you another math book," but its really enriching their lives.*

By the end of the school year, all of the girls spoke to us with glowing enthusiasm about the Internet correspondence with TCC. For example, Sarah's interview excerpt continues,

> *I wasn't too sure I was going to enjoy ... a blind person ... but now my impressions on that have changed greatly, because I'm enjoying it greatly, and it's a lot of fun knowing a person who's blind and being able to ask questions about being blind and things like that.*

Fiona's interview excerpt reflects another frequently expressed sentiment -- that TCC is now a friend:

> *I: Have your impressions about TCC changed over time?*
> *R: Since I first met him, yes they have.*
> *I: How have they changed?*
> *R: Well, I didn't think that he would become my friend and I would write to him a lot, but he has become my friend -- one of my best friends ...*

The study presented below attempts to identify some of the factors which contributed to these shifts in the girls' attitudes toward TCC and to the concepts of blindness and ability/disability during the first five months of their Internet relationship. Through a variety of learning activities which will be described, the girls developed substantive knowledge about TCC's blindness. As they came to know him through his letters and other mail, they also developed a broader understanding of other aspects of TCC's identity beyond his blindness. As TCC

remarked in an E-mail interview,

> *Picture yourself in the girls' position when they first met me. All they have to draw on is their life experience so far. At first, all I am is a bunch of text which is probably connected to another person and which the teacher says is different in some way. I allowed the difference to be known and explored at their leisure, which also caused similarities to be explored simultaneously.*

We turn now to describe the girls' experiences. Because Ms. Ebert encouraged self-directed learning tasks on the MOO, the girls proposed the type of work they wanted to do and she provided assistance when they requested it. The only stipulation she made was that the students respond to most of the letters and stories that they read. We begin our discussion, therefore, by considering the students' reading and writing experiences. In addition to furnishing a learning context in which to practice their language skills, the students' E-mail correspondence with TCC provided an impetus for them to begin to explore the social and communicative borders between the sighted and the blind.

First Encounters with Blindness: Barriers to Reading and Writing E-Mail

In the weeks following their first contact with TCC, the girls demonstrated increasing enthusiasm for the Internet letter-writing exchange. Typical field notes from these sessions begin with a description of the girls dancing noisily into the library with a chorus of questions about their keypal, and then promptly settling down at the computer terminals to read their mail. It is important to point out that the girls were faced with especially challenging reading tasks, since the letters TCC sent to them were not geared toward a third grade reading level. On the contrary, TCC wrote sophisticated prose, in a delightfully rambling style that was sometimes philosophical, sometimes highly technical, frequently witty and ironic, but rarely simple. The short E-mail

exchanges excerpted below, are indicative of this style:

To: ollie@maria.inde.com
Kristina [1] wrote:
What does TCC stand for?
TCC writes:
Whatever I stand for. What does Kristina stand for?
****
To: ollie@maria.inde.com
Danielle [1] wrote:
How old were you when you were allowed to cross the street by yourself?
TCC writes:
Very good questions ... and I don't remember. Question to you: How old do you think would have been wise for me to be when first walking alone?

Also, rather than produce straight-forward responses to the girls' factual queries, TCC often sent a tentative answer, and then directed them to additional on-line information sources that he was aware of, including places at the MOO, like an on-line dictionary, and various Websites. For example:

To: ollie@maria.inde.com
Robyn [1] wrote:
What does tumor mean? And what does seizures mean?
TCC writes:
Very good questions, but hard to answer. Fact is, I've never heard good definitions or had to describe them before. Anyway, so I'll give answering a shot, and, please, feel free to ask for more clarification & explanation & description (the worst I can do is say "I don't know" or "here's somewhere else to look").
@define tumor' at MU says:
*** *DEFINITION OF: TUMOR*
... n ... Chiefly Brit. 1. Swollen or distended part. 2. Abnormal mass of tissue that is not inflammatory, arises without cause and possesses no physiological function ...

In addition to the communicative borders posed by the mechanical complexity of TCC's letters -- vocabulary, grammar, and style -- attitudinal differences about blindness often made TCC's early E-mail difficult for the girls to understand. In every session that we observed, however, the girls

displayed dogged determination to make sense of the letters and to understand, as precisely as possible, what TCC had in mind in writing them. To illustrate the challenges the girls encountered in understanding TCC's letters, we present an excerpt from field notes which records their struggle to comprehend an alternative perspective on the meaning of blindness:

> *Robyn and Fiona had asked if TCC's friend, Keith, was blind or not ....*
> *Fiona read the response, which said, "Blindness is in the eye of the beholder".*
> *Fiona asked Ms. Ebert, "What does that mean -- 'blindness is in the eye of the beholder.' Is he blind too?"*
> *Ms. Ebert, meanwhile, was busy trying to help Sarah, so Fiona asked again, "What does that line mean -- 'blindness is in the eye of the beholder'. He doesn't answer our question."*
> *Ms. Ebert then said, "Yes, he asks you another question. What do you think it means? What do you really want to know about him?"*
> *Robyn said in an exasperated tone, "Can he see or can he not?"*
> *Ms. Ebert then laughed out loud at this and said, "I like this one!" She then said that she thought Robyn should basically ask this question ..... Ms. Ebert suggested that maybe they begin by saying "We have more questions."*
> *Robyn then said, "We should say, Hey Keith! Are you blind or not?" ....*
> *Sarah then says, from the side of the room where she's supposed to be working, "Is Keith blind?" Ms. Ebert replies, "They already asked that."*
> *Then she told Sarah what Keith had said (that blindness is in the eye of the beholder). Ms. Ebert asked, "What does that mean?"*
> *Sarah says, "It means ..."*
> *And then she stops, puzzled.*
> *Ms. Ebert says, "They want to make you think. They don't take questions at face value."*
> *Robyn then laughs and giggles and says, "We'll look it up in the dictionary -- 'blindness' and 'the beholder'."*

The field notes, E-mail correspondence and interview transcriptions suggest that the students' enthusiasm to read TCC's letters skillfully and comprehensively was driven by their developing desire to develop a bond of mutual understanding and friendship between themselves and their keypal. As we will show, Ms. Ebert facilitated and guided the girls' activities on the Internet. Their commitment to reading the letters thoroughly, however, appears to have

developed as an authentic and emergent goal of the exercise, rather than having been externally encouraged by the teacher. At least two interrelated explanations account for this motivation on the girls part to read TCC's letters. First, as Ms. Ebert explained during an interview session, the experience of receiving mail written *especially for them* was a strong incentive for the girls to read these letters with particular care. Second, being able to attribute the letters to a real, live *person*, rather than merely an abstract author, seemed to pique the girls'curiosity and to increase their interest in understanding his point of view. In these respects, reading became the first step in the girls' journey to cross the perceived borders separating them from their potential new friend.

The following field note excerpt is indicative of both these themes -- the girls' desire for complete understanding of the meaning of the letter, as well as their efforts to map what they read onto their image of the writer. Confusion and demands for clarity ensue when the image they had attributed to TCC did not seem to be validated by the contents of the new E-mail message:

> *Robyn began by reading her letter out loud. The letter is quite long and it explains how TCC became blind ...*
> *After Robyn finishes reading, Ms. Ebert asks Robyn, "Do you understand what all he told you?".*
> *Robyn shakes her head no.*
> *Ms. Ebert laughs and says, "What didn't you follow?"*
> *Robyn says, "I don't know what 'brain tumor' is. I don't understand."*
> *Ms. Ebert suggests then that in her response to TCC, Robyn might start out by saying, "Hi, how are you?" and then ask these questions ....*
> *Robyn is now typing her letter slowly. Her first line reads: "Hi. Good morning."*
> *Robyn then begins to type her question about the brain tumor.*
> *Fiona says from the side, having listened to some of the conversation between Robyn and Mrs. Ebert, "I know what it is. It's this thing on your brain that makes you sick."*
> *Robyn ignores this and continues to type, writing, "What does tumor mean? And what does seizures mean?"*
> *She then begins to review other parts of her letter, reading these sections out loud, with Ms. Ebert standing by her and asking questions in an effort, I*

presume, to elicit questions and ideas from Robyn as to her response to TCC. So, for example, in the part of the letter that said that TCC was violent for a while, Robyn asked Ms. Ebert, "Is he still violent?"
Ms. Ebert explains that this was when he was young.
Fiona says from the side, "I can't imagine TCC violent."
Then Robyn said, "We should say, 'Are you still violent?"

As this passage indicates, the girls were first motivated to write to TCC to learn more about him. They sought to resolve misunderstandings and, specifically, to learn more about his experience of blindness. Composing letters, therefore, was not an end in itself for the girls, but a means for developing a more complete picture of their new friend and for establishing a stronger communicative bond with him. The issues of conceptual clarity and the reader-writer relationship, which were crucial in the development of their reading skills, held similar importance for the girls in their writing tasks. With encouragement from TCC and Ms. Ebert, girls began to contemplate the practical distinction between composing merely technically correct sentences and sentences that were also meaningful to their reader. In particular, they were challenged to express themselves to TCC without relying upon visual cues and references. Although they took such references for granted, TCC insisted repeatedly that visual markers were not meaningful to him and requested clarification from the girls. In their efforts to describe their own world and to question TCC about his experiences in ways that did not depend upon visual images, the girls practiced writing more explicitly and precisely to their keypal. To illustrate, we present excerpts from field notes and E-mail letters which trace one of Kristina's early attempts to explain her queries about TCC's physical appearance:

Kristina had asked TCC to describe to her what he looked like.
He had written back, "Tell me what you mean by 'look like?' and maybe I can answer you better."
Kristina begins to type. She writes, "Look like means what do you look like?"

Ms. Ebert comes over ... She says, "you have to be specific. What do you mean? Does he know what you mean? How can he find out? He's looking for specifics"....
Kristina said, "well, what he looks like."
Ms. Ebert then says, "all right, well, ... tell him what you look like. Say something about yourself, and maybe he'll get some ideas about what to say about himself. So Kristina types: "Like: I have big eyes. I have narrow feet. I have long legs. I might get glasses. And everyone says I'm pretty ...I have long hair and I mostly wear body suits."
Ms. Ebert comments that TCC may not know what a bodysuit is. But then says, "Okay, well he can ask".

The two E-Mail excerpts below record the subsequent interaction between TCC and Kristina. In the first excerpt, TCC requests Kristina to clarify her own self-description. Kristina's response to him follows.

To: ollie@maria.inde.com
TCC writes:
Well, that sounds good. I don't think anybody's ever told me _I'm_ pretty, but a few people have told me I have pretty eyes ...
Kristina [1] wrote:
I have long hair and I mostly wear body suits.
TCC writes:
Not me. <silly grin>
Actually, could you describe a 'body suit' for me?
****
To: TCC <Tcthom@abcat.com
Kristina writes:
Hi it's me again the crazy one Kristina
TCC wrote:
>Actually, could you describe a 'body suit' for me?
Kristina writes:
A body suit has two snaps on it then you snap it. Well a body suit really looks like a leotard. Ballet dancers wear leotards. But leotards don't have snaps. Now about a body suit. You pull it over your head and you put your arms through the sleaves [sic] *then snap the crotch. It fits sort of snuggly. Not loose. The bell rang. I'll write more later.*
Kristina

It is significant to note here that TCC, and not Ms. Ebert, requests Kristina to be more specific in

her description of her clothing. It underscores the idea that clarity in writing is not simply an abstract requirement which the teacher imposes on students, but a necessity for meaningful communication between correspondents. In the process of learning to express themselves to TCC in a manner which was meaningful to him, the girls also began to reevaluate the significance of visual markers and to reconsider the preeminent place accorded to appearances in their conceptual categorizations of the world. We will discuss this further in a later section of this paper. For now, we turn to consider how the girls' desire to meet the needs of their audience contributed to their acquisition of technical skills and literacy and to the further development of their understanding about the social and practical experiences of being blind.

Awareness of Difference: A Context for Developing Internetworking Skills

As illustrated above, the need to consider audience is a facet of writing that was frequently highlighted as the girls corresponded with TCC. Their growing knowledge about his experience of blindness, which emerged in the process of reading his letters and in accessing the various Websites and other information sources which he recommended to them, heightened their perception of other types of borders that would have to be surmounted in order to achieve clear communication with him. Foremost among these was the matter of the *medium* of their interaction.

In their early E-mail letters, the girls expressed astonishment to learn that a blind individual was able to use a computer. They noted that they needed to *see* the keyboard to select the correct keys, and needed to *see* the monitor in order to read the words on the screen. They wondered how TCC could possibly write and read words on the computer without being able to

see what he was doing. TCC responded by directing them to Website information concerning *Speech Output Speech Access* (the voice synthesizing configuration he employed to read electronic text) and other computer applications employed by blind users. During their MOO work periods and during lunch periods, the girls visited these sites with Ms. Ebert. As they gained more information about what, to them, were the "foreign" ways in which TCC communicated with others (e.g., by reading Braille, and utilizing a Braille slate to compose text), the girls began to view the Internet as an extremely important link between themselves and their new friend. This realization appears to have had two results. First, they began to develop a better understanding of how the Internet works, and a growing awareness of the different ways in which people with different needs and abilities relate to this technology. Second, as a result of this change, both their motivation to use the computer competently and their level of computer literacy were heightened.

During interviews conducted at the conclusion of the school year, we asked the girls if they would prefer to write to TCC by using the computer or to write letters to him in longhand. All of the girls preferred the computer. Two suggested that composing at the keyboard facilitated the mechanics of composition, which enabled greater flexibility and enjoyment in the writing process. The following excerpt from an interview with one of these students reflects this point of view:

> *I: Would you rather write to TCC on the computer or use pencil and paper and send your letters through the regular mail?*
> *R: I'd rather do it ... in the computer because it goes faster ...*
> *I: Uh-huh.*
> *R: and ... the reason is I can type faster, and if I change my mind I can just hit backspace .... But if you mess up writing you have to erase it all ... and start over. So I'd rather use computers because computers they work faster.*

The other girls responded to our question by immediately associating writing with the concepts of communication and audience. Two indicated that the speed of transmission over the Internet made it a more appealing writing medium than "snail mail," since TCC could read their E-mail letters very soon after they had written them. More significant for the present discussion, however, is that some of the girls actually threw our question back at us. As they explain in the following interview excerpts, the choice between Internet and longhand writing to TCC was in fact was a false one, since TCC would not be able to read handwritten letters:

> *I: Would you rather write to TCC on the computer or use pencil and paper and send your letters through the regular mail?*
> *R: Well, if I sended* [sic] *it through pencil and paper, who would read it?*
>
> ****
> *I: Would you rather write to TCC on the computer or use pencil and paper and send your letters through the regular mail?*
> *R: Computer.*
> *I: Why?*
> *R: Because ... well, A, I don't know Braille quite perfectly yet ...*
> *I: Okay.*
> *R: ... and B, he couldn't use a pencil and paper.*

These responses suggest that the girls perceived Internet as a bridge between the otherwise incommensurable modes of written communication used by themselves and TCC. Ms. Ebert makes a similar point in her discussion of the computer as a 'halfway ground' between blind users and the sighted students:

> *R: You know, the blind community is willing to interact with these kids. There is a valuable resource that we didn't have any way of accessing .... these men have taken their time to write really good letters to these kids, to really read what the kids are saying, to really answer them .... and this is like something really valuable that could only have happened over the Net.*
> *I: Why do you think that?*
> *R: Because before you had men who read Braille and kids who wrote print .... But, a computer is a halfway ground. The kids can type on their keyboard and*

see their print, the men have speech synthesizers .... that computer is that common ground for them ... [it is] *their means of dealing with one another...*

This conceptualization of the Internet as an effective, possibly essential link between sighted and blind worlds appears to have played an important motivating role in developing the girls' computer literacy. What drew them to the computer seems to have been less the allure of the machine itself than the idea of having a tool with which to communicate with their keypal. For example, the girls used LYNX, a text-based platform to access the Net, rather than Windows. As a result, they did not have access to the colorful graphical displays and images commonly believed to be a major attraction of the Internet for sighted children -- and adults.

Some of the girls' technical learning (e.g., how to send and receive messages by E-mail and MOO mail) resulted from formal instruction by Ms. Ebert and from TCC's on-line advice. More of their computer and networking literacy appears to have been developed informally, however, as a "side-effect" of their efforts to learn about TCC and to become his friend. As Ms. Ebert emphasizes in the interview excerpt below, the girls did not readily distinguish between their correspondence activities and the technical skills necessary to make this correspondence possible:

I: Initially how confident were the girls about their ability to learn the technical skills necessary to use the MOO?
R: First of all ... they don't even think about the fact that there are technical skills involved. We know that there's technical skills you have to learn. To them, no, its just like learning anything else you learn in life -- that word "technical" is an adult term. Kids just see it as, "okay, I have to learn the rules to this game." You know, and it's like anything else .... like typing a word. It goes on the screen, and then something happens, and ... that to them isn't any big deal .... They just see it as skills that everybody should be able to do ... You can run the VCR, TV, MOO .... the kids don't know that they know so much about computers.

In an E-mail interview, TCC also suggested that the girls were not necessarily aware of the developing technical know-how:

I: What sorts of things do you feel that the girls have learned through their correspondence with you?
R: Well, that they _know_ they've learned, I'd say new information and attitudes related to interacting with blind people and probably with people with disabilities in general. I would say they're probably not aware that they've learned some important communication skills related to using computers and Internet. To me, it's important that they know how to use the Net for communication, and they are indeed quite comfortable with it, whereas other students who are new to the medium would find it mysterious or prestigious or baffling or whatever.

The informal nature of the girl's technological learning is also evident in the following field note excerpt, which reflects Ms. Ebert's surprise on discovering the knowledge the girls have "picked up" without directed teaching:

Ms. Ebert then helps them exit from the E-mail program, Pine, and gets them the command line in Unix. Robyn, seeing this, says, "What?" She then asks, "Now do we do telnet?"
Ms. Ebert looked at the girls and said, "You don't know telnet."
Then Robyn and Fiona said, "Yes we do! Yes we do!"
And then they recited how to telnet to the DU spot.
They said "telnet m-o-o-c-v-o-r-g-4-3-5-6."

Both the girls' formal and informal technical training took place in authentic contexts of use. In virtually every situation recorded in the field notes, they developed technical skills when a particular communication task required it. For example, the girls first learned LYNX and how to telnet to the MOO using UNIX commands, because these operations were necessary to begin communicating with TCC. When, in partial answer to their questions, TCC recommended specific Websites for them to visit, the girls were motivated to learn more commands, and to master other methods of accessing Internet information resources.

We have noted that the E-Mail interactions with TCC led the students to think about the Internet as a tool for crossing the communicative borders of time and space and language differences that separate potential correspondents and potential friends. Related to this, the girls'

need to master special skills in the process of communicating electronically with TCC also exposed them to the fact that the Internet is approached differently by different sorts of users. Their awareness of the variety of modes of experiencing network communication grew as TCC regularly shared his stories with them. The following E-mail excerpt, in which TCC responds to a letter from Kristina about the Zoo, provides one example:

> *To: Kristina the crazy one <ollie@maria.inde.com*
> *Subject: Re: the Zoo*
> *Kristina [1] wrote:*
> *>There are deer you can pet.*
> *TCC writes:*
> *I'm so used to hearing my synthesizer say 'beer' when it sees the word 'bear' that I thought you said "bears" instead of 'deer'. It took me a long time to realize my mistake. There's nothing to do to avoid this: its's just interesting and I need to keep that type of thing in mind when I hear things from the synthesizer.*

The students' awareness that Internetworking could be experienced in multiple ways also increased through directed teaching situations. For example, Ms. Ebert drew the girls' attention to the ASCII line drawings she had created for her reading rooms. Earlier in this paper we described the events which ensued from Ms. Ebert's inclusion of these graphics in her rooms at the MOO. Ms. Ebert shared with the girls her new awareness of the needs of blind users, explaining to them that while they could see the ASCII line drawings on the monitor, blind visitors to the MOO used a voice synthesizer to read the information on the screen. She explained that the *Speech Output Screen Access* (SOSA) configuration does not "see" the picture created out of the individual characters on the screen but instead "reads" what the drawings "say;" for example, "slash/backslash/dash". Ms. Ebert explained that in order to make her rooms more hospitable to blind visitors she liked to turn the drawing option "off," but gave the girls the choice of reading at the MOO with the drawings "on" if they preferred. It is unlikely that this broader

understanding of the complexities of information access on the Internet would have been developed had the girls not interacted with TCC.

Focused Exploration of Blindness and a Creative Transfer of Learning

During the girls' interchanges with TCC, Ms. Ebert assumed the role of a technical and conceptual resource, encouraging them to consider TCC's letters carefully and to respond to him with the same attention that he had paid to their mail. She did not position herself as an expert on the issues TCC raised with them, but emphasized her own status as a co-learner with the girls. Through this experience, a new bond developed between the girls and Ms. Ebert, with TCC, their mutual new friend, as its focus. Because of their shared interest and delight in learning about TCC and the world he opened up to them, the girls spent increasing amounts of time with Ms. Ebert during non-scheduled teaching hours, and participated in a variety of on and off-line activities designed to help them learn more about blindness. Although initially TCC's blindness was treated primarily as a *barrier* to be overcome through these activities, the focus of the group gradually shifted to exploration of blindness as a different and rich way of experiencing life.

Early on, the girls sent very concrete questions to TCC via E-mail and MOO mail about how, and even *if*, he could accomplish basic tasks for daily living. They asked him how he was able to cross streets safely, to order food in restaurants, to find the electrical outlets inside his new apartment, or to put on matching socks. TCC replied with good humored and detailed explanations of the ways in which he lives in a sight-biased world. The following E-Mail excerpt provides an example of his responses:

To: ollie@maria.inde.com
Samantha and Danielle wrote:
>... did you ever eat your pets [sic] *food by mistake?*
TCC writes:
Hmm... <sly_grin> Now, would I tell you if I did? Some things like that are a bit too embarrassing to admit to, but, luckily, the truth is pretty simple. The foods are different enough by texture and smell that I would have a difficult time _eating_ the wrong thing. Remember, too, that I keep things, especially foods, in their places, don't move them around, so I can know where they are because I remember where I keep them. Of course, opening the wrong thing is possible and very frustrating, but as I say, there are ways to avoid that ... and there's not much chance of my using the wrong thing once I've opened it to identify it more accurately.

On another occasion, when the girls asked TCC about his favorite sports, he responded by E-mail that he liked to swim and ski ...

Fiona said, "'How does he ski?"
Ms. Ebert said, "I don't know. Last week it was driving me crazy. You kept asking about swimming instead of skiing."
Then Robyn looked at Ms. Ebert, bounced in her seat, and said, "because if its a big hill, and what if there is a tree?"
Ms. Ebert said, "I don't know! Ask him!"

TCC responded to the girl's next E-mail with the following explanation:

To: ollie@maria.inde.com
Subject: Re: Hello again!! It's us again
TCC writes:
.... As far as skiing, now that gets a bit tricky. My guide has to be in constant verbal contact, which wears their voice out even under normal conditions, but adding wind, heavy fog, or snowfall makes things even more difficult. Anyway the ski guides are trained before they work with me, so they know what they're in for ... In fact, they're blind-folded once during training so they have some idea what it's like to ski without being able to _see_ the guide.

Gradually, Ms. Ebert and the girls increasingly engaged in simulation exercises and games, as well as the study of Braille, in order to explore further the experience and implications of blindness. For example, following the "Stuffed Animal Day" event, which led to their first

interactions with TCC, the girls attempted to identify their toys by touch, while wearing blindfolds. Later, they decided to eat their lunches with the blindfolds on. Robyn and Fiona describe this event and other activities inspired by the correspondence with TCC in the following E-mail:

> *To: TCC <TCthom@abcat.com*
> *Subject: Lunch*
> *yo! It's Robyn and Fiona.*
> *We ate lunch with blindfolds on. We had lots of fun.*
> *We didn't know what we had in our lunches.*
> *We sent you a recording, Robyn had jello and she didn't know what it was.*
> *Last Monday Ms. Ebert put our names on placemats in Braille.*
> *She put it on with fabric paint.*
> *Tomorrow we're coming for lunch. We are going to learn to read Braille.*
> *If we had never met you we would not be learning about Braille or doing projects involving blindfolds.*
> *We are having fun learning how to read Braille and other projects.*
> *Yours truly, Fiona and Robyn.*

In a separate E-mail, Samantha and Danielle asked TCC to suggest ways for them to learn more about *"what it is like not to be able to see".* TCC responded with the encouragement, *"Yep, keep doing what you're doing: imagining, questioning, experimenting."* He also contributed to their lunchtime learning activities by suggesting specific simulation exercises for the girls to try, and by sending them audiotaped "tours" of his apartment building, and recordings of his bus trips to the library and to other destinations. On these tapes, TCC would draw attention to the sound cues which he used to orient himself and the girls would try to listen for similar sounds in their own environment. In an interview, Danielle indicated her enthusiasm for TCC's tapes: *"He takes us on adventures and they're really cool. Like, if you close your eyes you can imagine that you're on the adventure."*

In return, Ms. Ebert would often audiotape the girls' lunchtime conversations and

"snail mail" these to TCC. In the midst of discussing schoolyard politics and soccer scores, the girls would turn toward the tape recorder and shout out questions and observations to their Internet keypal. They also spent time planning and making gifts for TCC. As Ms. Ebert notes in the interview excerpt below, a very important aspect of this activity was the girls' eagerness to consider TCC's perspective, and to figure out what sort of gift would be most suitable for him:

> *R: Then they went through this thing: "Okay we want to make things for him, and we want to make it something that will be real to him."*
> *You know, kids make things but usually they just draw pictures and hand it to their favorite person.*
> *And "well that wouldn't work so ... wait, we have to think of something."*
> *And they do, they actually take time ...*
> *At Christmas time they said to me, "Bean bags would work. It would work to make a bean bag for him because he could feel the beans..*

Through all of these activities, the girls expanded their understanding of what it means to be blind. Moreover, they developed a heightened sensitivity to the importance of practically exploring experiential differences between people, which, when left opaque, tend so often to pose barriers to social interaction. The girls' growing interest in revising the conceptual frameworks through which they understood and experienced their physical and social worlds, and the practice they gained in doing so, may be some of the most significant outcomes of the Internet correspondence with TCC. We make this claim not only in view of the evidence of creative thinking and shifting mental models which appears in the field notes, but also because, as we will show below, both Ms. Ebert and the girls themselves explicitly identified this development as a major result of the interaction.

The following three examples reflect stages in the girls' increasingly flexible attitudes

and perspectives toward blindness and difference during the course of the correspondence. The first example illustrates Fiona's creativity and perseverance in technical thinking, as applied to the question of blindness and to the possibilities inherent in TCC's notion of a "Braille mirror". Fiona's curiosity leads her to ask, "Is it important for an individual to see his or her own physical appearance?" This question is related to the issue facing Robyn in the second example. The field note there records her efforts to apply an abstract concept to a practical situation, and to reevaluate the significance of visual markers for understanding the world and the people in it. The important facilitating role of the teacher is evident in this section, as Ms. Ebert challenges Robyn to think critically about her assumptions regarding the relationship between physical appearance and interpersonal understanding. The third example highlights Samantha's social and social psychological reflections, as she extrapolates the knowledge that Fiona and Robyn are developing to a different set of social circumstances.

The Braille Mirror: Constructing and Confronting a Different Perspective

Our first example consists of field notes and E-mail excerpts which record Fiona's endeavors to conceptualize the workings of a "Braille mirror" -- which TCC had jokingly suggested might help him to know what he looks like:

> *Fiona then begins to type, "I read the part of Kristina's letter where you asked her to make you a Braille mirror."*
> *Fiona then says out loud, eagerly, "We should talk about a like a camera that can calculate what you look like and tell you what you look like."*
> *Ms. Ebert asks Fiona, "What would the camera calculate?"*
> *Fiona says, "Like eye color ... hair color."*
> *Ms. Ebert says, "Well put that in your letter -- what it should tell you ..."*
> [Fiona] *types to TCC: "I will try to invent a Braille mirror. It should calculate eye color, hair color, skin color."*
> *She then types: "Is TCC your name?"*

Fiona then erases this and then says out loud to Robyn who is at this moment saying that she's going to ask TCC if he wears dark glasses, that she herself has seen a blind man at her bus stop who wore sun glasses.
She then returns to her letter.
She types: "the camera would be like a camera at the grocery store. You know. Like the ones with the electronic doors."

From the E-mail:

To: TCC <TCthom@abcat.com
Subject: Braille mirror
Fiona writes:
I still want to visit you.
And I am going to try to make you the Braille mirror. (But I just don't know how to get the camera that calculates what you look like.)
Mrs. Ebert said you were being funny when you said that you wanted a Braille mirror.
I know that it doesn't really matter how people look. But you might want to know real bad what you look like.
I have to go to Math class <yuck>
Bye.
-Fiona
*****
To: ollie@maria.inde.com
Subject: Braille mirror
Fiona [1] wrote:
Mrs. Ebert said you were being funny when you said that you wanted a Braille mirror.
TCC writes:
True! <grin> I was also referring to virtual reality and wondering if maybe someday "mirror" can gain a tactile aspect (at least in true Virtual Reality with physical sensory I/O).
Fiona [1] wrote:
But you might want to know real bad what you look like.
TCC writes:
Nope, not me. It would have very little meaning to me ...
Remember, some of the things that you _see_ especially color, I can understand only in very abstract or very different terms. For example, with color, what would interest me is how they feel or what wavelengths make up which colors.
Fiona [1] wrote:
I have to go to Math class. <yuck>
TCC writes:
TCC likes math and science.

TCC does _not_ like homework or schoolwork.
TCC did the schoolwork, anyhow.
I like to learn things well enough to teach them (computers, for example).

Fiona's imaginative discussion with TCC about applying technology she has observed in the grocery store to TCC's situation illustrates her strong belief in the problem-solving power of technology. Her interesting intermingling of visual and tactile categories reflects her confidence that technological tools could conceivably translate across human sensory experiences. In addition, her comments are significant for the self assurance they reveal about her own capacity to identify problems and to theorize technical solutions. However, she does not make an *empathetic* shift in her thinking towards adopting the perspective or the role of the other: she does not examine the alleged "need" for a Braille mirror from TCC's point of view nor attempt to consider the issue from his perspective. This seems clear in the fact that she identifies TCC's experience as a problem in need of a solution, and in her dogged persistence to establish how a Braille mirror might work, even when she is told expressly that TCC doesn't need one.

Insides/Outsides: Facilitating New Outlooks

Earlier in this paper we referred to the girls' struggle to understand why blindness might mean different things to blind people and to sighted people. In that example, the teacher-librarian challenged the girls to contemplate the meaning of the expression, *"blindness is in the eye of the beholder."* The issue that Robyn deals with in the field note excerpt below is in some respects the flip-side of this idea. And as before, Ms. Ebert plays a particularly important facilitating role, by encouraging the girls to think critically about their assumptions concerning visual categories and the significance of personal apppearance. In the field note

below, Robyn's frustration is reduced as her teacher encourages her to think about issues from TCC's perspective and to consider why visual appearances may mean different things from blind and sighted perspectives.

> *Robyn and Fiona pulled up their letter from TCC....*
> *This was a letter in which, among other things, Robyn asked TCC his hair color and his eye color.*
> *TCC had basically responded that he prefers not to tell other people his eye or hair color because he doesn't feel that this information is most applicable to knowing a person.*
> *Robyn, seeing TCC's answer, said, "I have asked this question several times over, and I want to know the answer."*
> *Ms. Ebert came over and began to facilitate.*
> *Ms. Ebert said,, "I think the point is that on the Internet you usually try to get to know someone by asking them what they look like. But does a physical description really help you know who the person is?"*
> *Robyn said, "No, it doesn't tell you about their inside."*
> *Ms. Ebert then explained that TCC was not used to knowing people from their outside appearance.*
> *Fiona and Robyn commented that it was not possible for him to do so because he was blind.*
> *Ms. Ebert then said that TCC wanted people to know him personally, not through his eye or hair color.*

TCC's resistance to responding to Robyn's questions are important because it provides a concrete context of application for her to consider the otherwise fairly abstract idea that "it's what's inside that counts". While it is probably not case that she first learned such a maxim from TCC, it is he, with Ms. Ebert, who helps make the maxim "real" for her. While, as she indicates, this learning process was troubling and frustrating, it seems to have had important implications for Robyn's general attitude toward physical identity markers. Several weeks afterward, we asked her about the letter from TCC. Her response indicates an effort to extrapolate her ideas about the relative importance of visual appearance beyond the experience with TCC to other instances of social difference, perhaps including race:

I: A few weeks ago .... you asked about TCC's eye and hair color, and he wrote back to you and he said, "I don't want to answer because it's not important to me. I don't mind if people know, but I want to be sure that it's not important first." What do you think he meant by that?
R: I think he meant that it doesn't matter because it doesn't matter what color hair it is, it just matters what is inside and stuff. It doesn't matter what color hair, what color eyes, what color skin you have.

Knowledge Transfer: New Contexts for New Perspectives

Samantha's interview response below provides an even clearer example of the girls' growing capacity to transfer ideas developed or refined during the interactions with TCC, to different social contexts, and to relationships with others who are not blind:

I: What kind of things have you learned through writing to TCC?
R: ... that it doesn't matter what you look like on the outside, it's just what you are inside. That's why I didn't explain anything about what ... I think he looks like.
I: Uh-huh.
R: Kristina, the one girl, she has glasses but she won't wear them because she don't think she looks good in them.
I: Uh-huh.
R: And this one girl, Natasha, she didn't come to school one day because her hair wasn't fixed.
I: Uh-huh.
R: So they think ... well Kristina, she just doesn't want to wear her glasses, I don't think, but Michelle didn't come to school because her hair wasn't fixed right. I think it's better to have your hair sticking up to go to school, because wouldn't you rather learn than look better?
I: Uh-huh.
R: I mean you could look ... did you ever see the movie ... I forget what it's called but he was ... he was smart. He lived in a boiler room at the bottom of the library because he couldn't make no [sic] *money but he was so smart ... that ... it doesn't matter what you look like, it's how you are inside.*
I: Okay.
R: He was generous, he was nice ...
I And that's what really matters?
R: Yeah.

Given the examples of the girls' learning about blindness in the preceding sections, it is

not particularly surprising that Samantha says that TCC has taught her that *"it doesn't matter what you look like on the outside, it's just what you are on the inside,"* nor is it surprising to find her reciprocating this sentiment with respect to TCC himself, i.e. that *his* looks don't matter to her. In the second half of her response, however, she takes a different tack by applying this lesson about visual image to issues related to self-concept and self-esteem among the girls at their school, for whom blindness is not an issue.

These scenarios provide some evidence of the girls' creative thinking and changing ideas with respect to the relative importance of visual markers for understanding other people and for one's own self-concept. When we asked Ms. Ebert what she thought was the most important outcome of the girls' experience with TCC she responded by emphasizing the girls' changing attitudes toward his blindness, and their ability to look at the world "from different perspectives":

> *R: ... We've seen changes in the kids. You know, their E-mail, in the first place, was always like, "Well how do you do this? Well how could you cross the street? Well what if there's a hole in the ground?" Now their questions to him are more of like a person .... It's like, "Okay, this is a blind man. Good. He's blind, but he's our friend. And they're beginning to look at all blind people like that, "Wait, these are like normal people that we can talk to." Or they've learned how to describe something to someone else. You know, like visioned people we just look at something and go right on. But now they've learned ... they also learned to take this and make it feel significant for him. And so I guess they're literally beginning to see the world through another sense. And it just makes ... it does make your world a whole lot neater to start looking at it from different perspectives.*

The girls themselves pointed to similar outcomes. At the conclusion of the school year, we asked each of them what they believed that they had learned from their relationship with TCC. While we have described the influence of this Internet activity on their reading and writing

activities and their Internet literacy, the girls generally described the influence of their interaction with TCC in different terms. From their own perspectives, the most significant outcomes of their interaction with TCC were not matters of knowledge or skills acquisition but new ways of thinking about the differences and similarities between themselves and TCC, and the differences and similarities between "ability" and "disability".

They described their surprise, for example, to discover that TCC was capable of doing many of the same things they could do, although his method was different from their own. They indicated, for example, that although he could not read handwritten letters, he *could* read Braille; that while he could not see cars on the street, he *could* clearly hear traffic patterns and that he could walk alone safely in the city. Although he could not read printed labels on cans, or see the trees on a ski slope, TCC could, nevertheless, navigate his environment quite competently by relying on his other senses. The following interview excerpt illustrates Samantha's admiration for TCC's different abilities:

> *I: Have your impressions of TCC changed over time?*
> *R: .... my impression of him was he was a blind person, he didn't know how to do most things ...*
> *I: Uh-huh.*
> *R: But now I know that he can do lots of things that I can do .... He goes to the grocery store -- this is what amazed me -- and he picks out the right foods that he likes .... without even being able to see what kind of food it is.*
> *I: Uh-huh.*
> *R: And there was this letter -- he told us how he keeps his money. It's like he folds them in different ways ... so he knows the twenty dollar bill is in a rectangle and the square is like a five dollar bill, and the long ones are ones and tens and stuff.*

In addition, several of the girls also observed that TCC was also capable of doing a multitude of things which they could *not* do. Sarah's remarks below are illustrative of both kinds of

observations:

> *I: Was there anything about TCC or the things that he has written that have surprised you?*
> *R: Yeah.*
> *I: Tell me about that.*
> *R: What has surprised me greatly is he actually is able to go around the room without seeing, without bumping into anything to find a cane against the wall ...*
> *I: Uh-huh.*
> *R: .... and being able to go into a restaurant and order what he wants .... and able to actually read Braille! ... and ... being able to be a teacher .... because he was one in college ...*

In the excerpt below, Danielle takes this attitude to its extreme, and finds herself exaggerating TCC's various skills. While she corrects herself, her error is nevertheless telling for the extent to which she marginalizes any disabling aspect of TCC's blindness. In fact, blindness is omitted altogether from her description of her keypal:

> *I: In what ways is TCC different from you?*
> *R: Well, he's taller than me, he lives somewhere else from me, he ... knows more than me ... and he's bigger and stronger and other things from me ....*
> *I: Are there any ways in which TCC is different from your other friends?*
> *R: Yeah, he's bigger, he knows more ... he could do other things than we can, like he could drive ... no .... like he could ... let's see ... he could ... he lives by hisself* [sic]*; we don't live by ourselves. He goes on the computer a lot ...*

Danielle's comments are also significant for the very positive connotations that are associated with the characteristics which make TCC different from herself. These positive attitudes among the girls may prove to be a forerunner for changed perceptions about the distinction between "ability" and "disability" generally. Sarah, for example, commented,

> *I used to think blind people were helpless .... Blind people are not exactly helpless. They are very interesting people. They can do a lot of things that we can't and we can do a lot of things that they can't do ..."*

Fiona's remarks are similar:

"People with disabilities aren't that different. They can do mostly the same things that you can, but they just have a disability.

In an E-mail interview with TCC, we asked his opinion about the girls' relativistic attitudes toward "disability" and their equation of "disability" with a different set of "abilities". As his comments suggest, the changes in the girls' attitudes toward these issues are ongoing, and the implications of such changes remain to be assessed:

this reminds me that recently Fiona asked if I like being blind. It's hard to know how to answer such a question since I'm not used to thinking in terms of whether I like/dislike who I am, especially regarding things over which I have no control. But maybe this is where she was coming from, the idea that, yes, everybody has differing abilities. We'll see where the discussion goes in coming weeks. The idea of everybody having a different set of abilities and/or preferences ("learning styles," if you will) is very important to me, so I will probably see how I can fit it into the discussion.

Conclusion

The case study presented here illustrates elementary school students' explorations of the experience and social meaning of blindness in the context of an Internet E-mail correspondence with their blind adult "keypal". Rather than maximizing the potential for "difference blindness" over the Internet; that is, the opportunity to mask personal identity markers during on-line interactions, Internet technology was successfully utilized here as a medium for focussed exploration of the practical and social differences *of* blindness. The study demonstrates some of the ways in which this learning contributed to the students' substantive knowledge about blindness and to their changing attitudes towards the idea of "disability" and of social differences broadly. In the process of developing a friendship with their "keypal", the students also encountered challenges and incentives to improve their reading and writing skills and their level of

computer competency. These two types of change formed an integrated learning path for the students which led them to cross the social and communicative borders that first appeared to separate them from their new Internet friend.

The students' growing understanding of the world of blindness and its relation to their own, sighted world occurred in three stages. In their first hesitant encounters with the idea of TCC's blindness, they perceived his difference from them as an obstacle to developing a relationship with him, even though they were enthused about the prospect of a personal E-mail correspondence. In the context of practicing reading, writing, and Internetworking skills, the students received increased exposure to concrete differences and similarities between blind and sighted people. This new practical learning about blindness both served to neutralize the negative connotations which TCC's blindness originally held for them and piqued their curiosity about his way of living in the world. Increasingly they were motivated to explore his experience in greater depth. Through this process, their initially skeptical attitudes toward corresponding with TCC began rapidly to change. By the third stage of this development, the girls displayed a growing willingness to revise their ideas about distinctions between blindness and sightedness; and ability and disability; and they expressed exceptionally positive feelings about TCC. In addition, the girls also demonstrated a capacity and interest in transferring their new knowledge and attitudes to new situations and to other groups of people.

The experience of an authentic interaction with a real, living correspondent appears to have strongly motivated the students in this study to read and to respond to difficult texts with exceptional care. While the students were motivated to read and to write because their keypal was a real person, all the same, the correspondence took place in a virtual environment. For this

reason, their developing relationship with their keypal also encouraged them to increase their Internetworking literacy. The students' technological education took place in a context of authentic use, with the result that they seemed not to distinguish between the experiences of learning the technology and participating in the correspondence. The students' enthusiasm for their MOO activities did not seem to derive from any perceived "glamor" associated with the technology or the computer itself. Rather, they identified the Internet as an effective, and possibly essential tool for communicating with a new and important friend.

The Internet correspondence also led the girls to engage in a variety of learning activities off-line, including blind simulation exercises and studying Braille, which further enhanced their substantive knowledge about blindness and contributed to their changing attitudes and perceptions about the concept of "disability." Moreover, their relationship with their keypal provided the students the opportunity to think concretely about abstract ideas like,

> *it doesn't matter what you look like on the outside, it's just what you are on the inside.*

After corresponding with their keypal for five months, the students were both willing and able to transfer ideas such as these to other settings and situations unrelated to issues of blindness/sightedness. Moreover, the association of blindness with disability had markedly receded from their perspective, and an increasingly flexible understanding of the disability/ability distinction appeared to have taken its place.

The relative infancy of the Internet as a school-based technology means that as yet, fairly little empirical evidence has been garnered to substantiate or to modify the claims of the proponents of educational uses of the Internet. This case study is intended as a

contribution to this growing literature. The positive outcomes associated with the Internet learning activity that we have described suggest that this technology *can* provide valuable contexts for skill and knowledge development at the elementary school level. It is important to emphasize, however, that the real factors underpinning this example of rewarding Internet use were not technological in nature. People, willing to engage in frank and open dialogue about the differences between themselves, made this Internet activity a success. Thus, while the Internet may be conducive to interpersonal relationship building because of its "difference blindness," which allows individuals to mask the social differences between them, the lessons drawn from this case study suggest that the opposite may also be true.

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