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Internet conferencing tools for deaf and hard of hearing users

Lee Kowalsky

Internet Conferencing Tools for Deaf and Hard of Hearing Users

By

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The Evolution of Internet Interconnections

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Abstract

This research study investigates Internet chat visual tools in communications used by Deaf and hard of hearing users and how the users interact with the chat tools expressing their visual language to convey the best message they can in general. A number of Internet chat tools consisting of visual emoticons have been established and implemented for online communications. These tools are generalized for public use. In this study, the research includes the current IM model, along with my recent studies, which use Deaf/hard of hearing for this project. An analysis of the results and prototype of this study on Internet Chat tools for Deaf and hard of hearing users is included. The majority of the Deaf and hard of hearing users prefer an animated library of smiley faces.

Introduction

There are compelling legal, economic, social and moral arguments for providing all Deaf users access to information technologies. The needs of Deaf users have not been included or assessed during the process of software and hardware development, design and evaluation. There is one plausible explanation for this problem - lack of awareness of needs of Deaf. The Deaf population becomes further isolated, by innovations of technology, from the hearing society. Providing accessibility means removing barriers to allow Deaf users to participate in substantial life activities. These include the use of products, services and information.

The goal of this thesis is to design and administer a survey for Deaf persons to share their perspectives on how adjustments to existing technologies could help to fulfill their needs and increase their knowledge, while allowing access to the Internet chat tools software. A further goal is to determine the level of need for such software. Improving technologies for targeting Deaf users will require a survey. The results of this survey might help determine the need for the development of Internet conferencing tool software to fulfill and serve the purpose of technological access for the Deaf and hard of hearing users.

Not all Internet users are aware of the availability of the Internet chat tools software such as I Seek You (ICQ), AOL Instant Messenger (AIM), or Yahoo Messenger (YM). ICQ, AOL, YM or any other similar chat tools they are the applications that provide opportunities to chat, send messages, files and URL's and play games. They are the same tools, but they have different servers. For example, an apple and an orange are in the fruit category but they are different from each other. It is the same principle with the Internet Chat tools.

Internet users come from variety of educational experience, social life and/or exposure to technology. It is my hope, in this project, to educate Deaf users with their experience in the differing designs of the Internet chat tools. I seek to learn how the software tools can be tailored to our needs. Perhaps a visual aid, such as a blinking screen, could be incorporated which would capture our attention.

Hearing users rely on the sounds of the tools to let them know that they are being called by other users. Most Deaf users have no way of knowing if they are being called since the cues are auditory and not visual. It seems normal for Deaf users to accept the fact that the current software tools do not meet their needs. Logging on or leaving on their ICQ/AIM could be improved by setting "blinking cues", changing the background screen color, or having an announcement box that would appear on the top of the program to alert Deaf users to new messages.

These possible implementations are the result of a meeting I had with 7 Deaf users from different backgrounds. I sought their input on how Internet chat tools software might be improved which will meet their needs.

Problem Statement

The purpose of this study is to find ways to adapt Instant Messaging (IM)'s model of Internet chat tools to Deaf/hard of hearing users to afford them the same full access to the Internet as those who are hearing. My hypothesis is that IM's approach has applications to Deaf/hard of hearing users, although they differ in their use of technology, graphics and auditory cues from those used by hearing folks. It could be hypothesized that Deaf/hard of hearing users and oral users have different communication norms when it comes to interaction and cultural needs and perhaps, communication barriers.

Additionally, I think that we who are Deaf/hard of hearing do not realize what Internet chat tools we have missed in the same manner as hearing users. It is the goal of this study to see if IM's chat tools will provide the needed support for communications for Deaf/hard of hearing users.

Research Questions

From previous research presented the following two questions are formulated:

1. What are the pros and cons of newer technologies such as Wyndtell, Chat, Instant Messaging and ICQ systems?
2. What impact do Internet conferencing tools have on their Deaf messaging clients?

We are social beings who exist in groups such as families, classes, schools, communities religious institutions, and work place settings. Part of our socialization encompasses our need to understand and be understood by those with whom we have contact.

Deaf people are too frequently isolated from the very communities in which they live, play and work. This isolation may lead to lack of good self-esteem along with lagging behind educationally. Many Deaf people are born into hearing families and are forced to use oral methods to communicate with their family and friends. I am one of a set of identical Deaf triplets born into a hearing family. Initially we communicated through a series of "home signs". Our parents recognized the need for the family to enroll in sign language classes.

Deaf people are frequently isolated from others--the hearing and the Deaf. This isolation is the result of incomplete or inaccurate communication. Today the use of the computer has opened up a completely new world for the Deaf, as it has for others.

Blind persons and persons with limited use of arms or hands, or those who are vocally impaired, have access to computer programs designed to provide them with information through voice programs. They do not have 100% access as people with without physical limitations to the Internet do. Deaf and hard of hearing people need more user-friendly technology. By making Internet tools more user-friendly, to the Deaf. The playing field can be make more level and Deaf people will be capable of advancing as far as their talents take them.

There is a growing focus on newer technologies such as Wyndtell, Chat, Instant Messaging, and ICQ systems promoted by software and/or hardware researchers and developers. A large and diverse user population that is generally overlooked is the Deaf users. The newer technologies incorporate a lot of media that have sounds such as Media Player (real live chat with sounds). A lot of media on computers do not have open captioning that would serve regardless of their hearing level.

<u>Personal Rationale</u>

This study has significance to me personally. As a Deaf person, I feel it is important to study the use of Internet Chat Tools and the cultural differences in using these tools between Deaf/hard of hearing and hearing users. With such a strong interest in Deaf Culture, especially in the area of the interaction of Deaf/hard of hearing users on the Internet, I desire to conduct a pilot study on these kinds of interactions and analyze the findings.

<u>Scholarly Rationale</u>

The most important barriers preventing the Deaf/hard of hearing from achieving full and equal access to multimedia products are technological challenges, lack of knowledge and awareness concerning access issues, and the costs involved in developing solutions. It is my belief that the access barriers created by interactive multimedia programs cause a knowledge lag and/or slow the learning curves among Deaf/hard of hearing users when it comes to technological interaction.

I believe it is necessary to begin to add to the scholarly information about the cultural norms in the Deaf community. Also, I assisted in enhancing Internet awareness and interactions between the Deaf and hard of hearing by conducting a first and second roundtable discussion on Deaf/hard of hearing messaging users because it helps to understand the needs of further animated visual IM. Software scholars need to have an appreciation of the fact that the use of Internet chat tools varies from user to user and creating Internet chat tools. The determinations for developing and creating the Internet chat tools may vary within both the hearing culture and the Deaf culture.

<u>Social Rationale</u>

Every day Deaf/hard of hearing users communicate online with each other or with hearing users all over the world. It is important for software developers to understand Deaf/hard of hearing users' need to be able to interact online. Developers and hearing users are forging ahead with multimedia technology that may not provide accessibility for all.

Individuals with hearing disabilities suffer the loss of entertainment to some extent due to a missing audio portion. They also suffer from a lack of educational opportunities and employment options that result from their inability to *hear* the cues provided. It is the responsibility of the Information Technology industry to develop and support multimedia products that are accessible to, and usable by, people with various disabilities. This should be the commitment of the Information Technology providers to promote multimedia products that have 100% accessibility for all.

<u>Literature Review</u>

Multimedia presentations rely on highly dynamic visual and audio formats to present information to the user and this creates potential barriers for Deaf users. Multimedia software developers expect the users of their programs to access both the audio and visual information. However, the information presented in each medium conveys only part of the message and cause these presentations not to be fully accessible to the Deaf. Very few multimedia products are 100% accessible for the Deaf/hard of hearing. Deaf/ hard of hearing must be content with the design of IM because they are able to choose the color of background, font emphasis, and high capital letters to express their thoughts and/or feelings. Instant Messaging (IM) also includes emoticons and sounds but they do not serve the full purpose for Deaf/hard of hearing users because Deaf persons cannot hear the sounds. Therefore, the accessibility to IM has created a sound barrier for the Deaf/hard of hearing.

The Internet has been said to level the playing field for individuals with Deafness. When a Deaf individual uses the Internet, the other users do not know that person is Deaf. However, according to the study *Technological Trends In Wireless Telecommunications*[1] conducted by Gallaudet University-- individuals who are Deaf or hard of hearing are not able to use aural output such as beeps, speech or music. They are also unable to use productivity tools that are voice-based (Internet phone and voice/speech recognition) software. Deaf people must depend on text-based productivity tools. "People with sensory disabilities are especially concerned about access to computerized multimedia programs because multimedia presentations rely on highly dynamic visual and audio formats to present information to the user"[2]. Examples of these tools are: America Online Instant Messaging, Wyndtell and ICQ.

What is Internet Chat? Traditionally, it is text-based (but can also involve audio and video) and real-time.

> "More than 750 millions messages are sent each day through AOL Buddy List community (America Online, AOL IM) and the company's ICQ service. According to AOL, there are more than 40 million registered users of AOL's Buddy List and Instant Messenger services, who send more than 430 million messages each day. There are an additional 38 million registered ICQ users, who send an additional 330 million messages each day."[3]

This chat can take place anytime of the day or night and you can have a conversation with any other user who happens to be on-line. That is what chat is. It is one of the most popular activities on the Internet and involves people from all over the world. This is considered a breakthrough for Deaf people.

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[1] http://tap.gallaudet.edu/Hatfield_b.htm
[2] *Technological Trends In Wireless Telecommunications*
[3] http://www.corp.aol.com/whoweare.html?

For the first time we are able to communicate with anyone without obvious barriers. However, there are several drawbacks. The multimedia seems not to be designed for Deaf/hard of hearing users. AOL Instant Messaging is a program where the user can see if his/her friends are on line it provides the user an opportunity to send them messages.

ICQ is a personal chat client that works in conjunction with friends and family who are on line. ICQ comes complete with all the "bells and whistles" to allow friends to communicate over the Internet. ICQ requires both users of the chat session to be running ICQ. ICQ and AOL run on personal computers at home.

Wyndtell is the most complete wireless communication service available. It is designed specifically for people who are Deaf or hard of hearing. Wyndtell involves a pager-like device that is large and awkward. Deaf people have to give their undivided attention to the device in order to send or receive a message whereas hearing people can listen to their cell phones while seeing what is going on in their surroundings. This is about focusing on their devices differently.

While these newer technologies enable Deaf users to become freer of communication barriers, there are drawbacks. Deaf people rely greatly on facial expressions, which are missing from these newer technologies. Deaf people also depend on the manner of the content of communication to reflect their expression such as bold for emphasis, text size and color for visual purposes, and so forth.

Methodology

Sampling and Data Collection

There were six steps in doing the methodology aspect of my thesis project:

Step 1: I developed the quantitative questions then distributed the questionnaire to get at least 100 responses. This was an e-mail survey dealing with experience with ICQ, Wyndtell, AIM, and AOL, etc. (See Questionnaire Figure 1: Appendix A, page 40). I didn't personally know all of these 100 folks. I got a list over 100 Internet users from several sources: my roommate, a coworker, and my friends. This was just a random sampling of the Deaf/hard of hearing Internet users that my friends gave me. I e-mailed them with my homepage address for them to click and do the questionnaire

Step 2: Periodically, I went to my Website to see how many responses I had received. When I saw that I had reached 100 responses, I authorized my Website to not accept more responses because I wanted exactly 100. After collecting responses from these 100 e-mail users, I prepared and created an in-

depth questionnaire for a focus group of other 10 persons ranging from frequent Internet chat users to infrequent users. I contacted and invited 10 Deaf/hard of hearing users, within 40 miles of where I live to come to my home for a two-hour round table discussion. I am in a bowling league and I happened to know five other Deaf bowlers. I asked them if it was possible for them to come to my home to be part of the roundtable discussion. All of them agreed. In order to bring this group to a total of ten, I asked some of the bowlers to bring spouses, coworkers, husbands/wives, coworkers, or friends to participate in the roundtable discussion. I invited 40 persons to the focus group. 7 showed up.

Step 3: I analyzed the results of the quantitative and qualitative study from 100 e-mail responses and seven-person results (See Appendix C, p. 49).

Step 4: I analyzed the results and discussions with the e-mail and focus group of seven users at my home for the roundtable discussion I was able to build prototype based on the data collected. Also, I was able to analyze the data and comments/suggestions from the roundtable of seven participants for comparison and include ideas about how to build an IM prototype that would improve accessibility for everyone.

Step 5: I showed possible prototype to the same participants from the first roundtable discussion group and perform usability tests before finalizing prototype.

Step 6: I prepared to analyze results from e-mail users and the focus group. Compare the possibility of feedback and comments before drawing a final prototype. Then I submitted a report.

Step 7: I developed a possible prototype from the first roundtable discussion as well as the second roundtable. A prototype was developed and created in the Director software program. (Appendix h, p. 64, enclosed CD).

From here, I collected the information on IM and ICQ online and compared their Internet chat tools. I designed and implemented a questionnaire survey that was focused on the usage of the newer technologies that are specifically for Deaf/hard of hearing users. I developed the questionnaire on the Website. To begin the data collection I used Internet chat tools Instant Messaging Systems like AIM and ICQ.

After the questionnaire was all set for e-mail distribution specifically for Deaf/hard of hearing, I asked my Deaf coworker, Dave Binning, a 1981 NTID graduate, and 19-year employee with IBM, if he had

a list of Deaf/hard of hearing users in the state of North Carolina. I did not know anyone in North Carolina. Dave gave me a long a long list of his friends from North Carolina and I also used my friends on my AOL buddy list. I had about 200 names and I sent them a duplicate e-mail, which went, all over the country. This was done in an effort to get 100 to participate in the survey (see Appendix A, p.40). Only 2 days later, 100 respondents filled out the survey through the Website using *Freepolls* software Plus, I program and I was elated and blessed. See Figure 1:

I came up with the questions used for this study (See Figure 1). The questions of how and why I created specific questions and the justification for including them can be found in see Appendix B, p. 46.
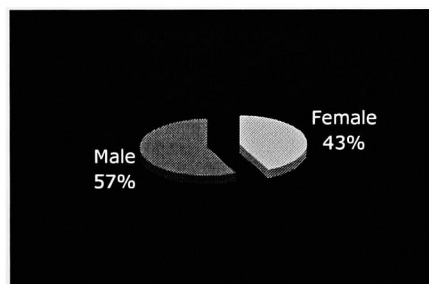
Results and Discussion

*Results are in **bold**.

Following the results of the Internet questionnaire and some initial interpretation of the data.

<u>Questionnaire on the Website:</u>
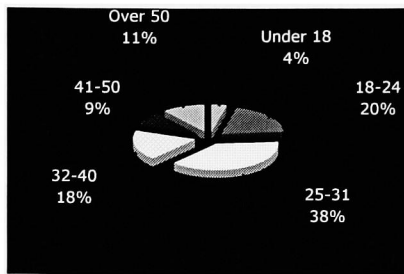
Figure 1

1. What is your gender?

Total Responses: 100

Female (43)	**43%**
Male (57)	**57%**

More participants are male, 57% with female respondents, 43%. It is my guess that most of those who responded are Information Technology majors or in the field of Information Technology and/or are comfortable with the use of computer.

2. What is your age group?

Total Responses: 100

Under 18(4)
18- 24 (20)   **20%**
25- 31(38)   **38%**
32- 40(18)   **18%**
41- 50(9)   **9%**
Over 50(11)   **11%**

The results of the participants' age group were well balanced. This shows that the users are of varied ages from under 18 to over 50, and indicates that they have access to the Internet all over the country. Those that get on the Internet are on the right track of learning the needed Internet tools to stay in the loop because it means continuing accessibility for them, regardless of their age.

3. Mark highest grade completed:
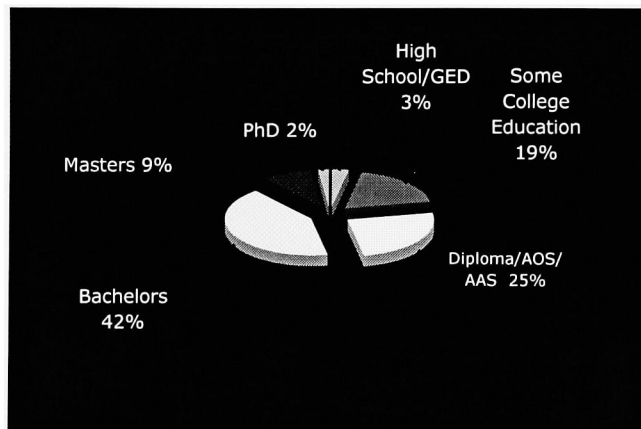
Total Responses: 100

High School/GED (3)   **3%**
Some College Education (19)   **19%**
Diploma/AOS/AAS (25)   **25%**
Bachelors (42)   **42%**
Masters (9)   **9%**
Ph.D. (2)   **2%**

13

Ninety-one percent agree that using the Internet chat tools enhances their communication skills with regard to technology. It seems to me that by understanding how to use chat tools we boost the users' confidence and knowledge. This confidence and knowledge empowers them and allows them to advance through the use of technology to increase their awareness and to upgrade their skills in technologies. As indicated, only one percent say they do not know if the skills they have with Internet chat tools have prompted them to feel good about their communication skills.

4. What is your communication preference?
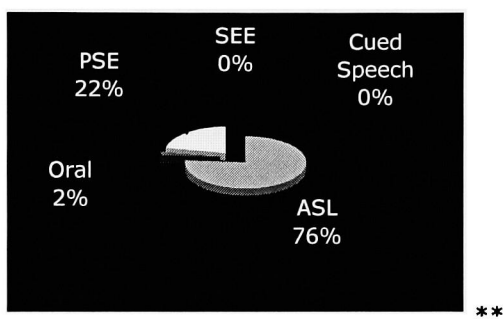
Total Responses: 100

ASL (76)	**76%**
Oral (2)	**2%**
PSE (22)	**22%**
SEE (0)	**0%**
Cued Speech (0)	**0%**

The majority in the Deaf/hard of hearing culture use ASL, saying that ASL is their communication preference.

**ASL: American Sign Language
SEE: Signing Exact English
PSE: Pidgin Sign English

5. Please indicate number of hours you spend using the Internet in a week:
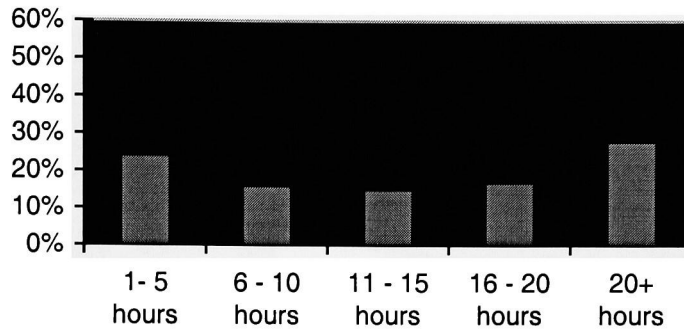
Total Responses: 100

1-5(24)	**24%**
6-10(16)	**16%**
11-15(15)	**15%**
16-20(17)	**17%**
20+(28)	**28%**

These data exhibit a bimodal distribution: more respondents are at the extreme ends of the scale than in the middle.

It seems to me that the people who filled out the Website questionnaire who use the Internet as part of their livelihood as well as those who rarely get on the Internet – probably checking their mail, or having short chats with their friends online. This last group finds doing something else is more important than spending so much time on the Internet. The users over 5 hours and under 20 hours online per week are in-between the less frequent and most frequent Internet users.

6. What purpose(s) do you use the Internet for: (mark all that apply)
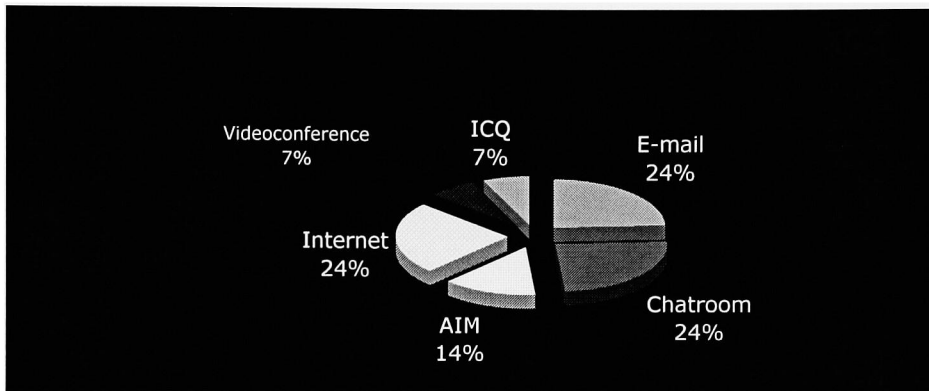
Total Selections: 169

E-mail (43)	**25%**
Chatroom (43)	**25%**
AIM (24)	**14%**
Internet (43)	**25%**
Videoconference (4)	**7%**
ICQ (12)	**7%**

It is important to include this question because the purposes of using the Internet helps me to see which tools the users prefer.

I see the most popular aspect of using the Internet is the chatroom. I suspect it is because of the AIM privilege: a library of smileys, special font selections to enlarge or make text, furthermore, there is no charge to download the chatroom file from the Web. The percentage of E-mail and Internet are the same as those from the chatroom usage. I strongly believe this correlation is due to the fact they are free to download and install the software, which is simple to use. The GUI is easy to understand, learn and apply on the Web.

The fewest selected usages were those of videoconference and ICQ. Videoconference is expensive to buy as the software and hardware for the videoconference ranges from $80 to $25,000[4] depending on the quality of the product and the speed of the connection such as Roadrunner[5], cable modem, etc.

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[4] http://www.s-vision.com/products/EnVision/

7. Do you use the following:

- Graphics,
- Graphics/Icons,
- Animated Text,
- Color text,
- Animated Graphics/Icons,
- A Library of "Smileys"
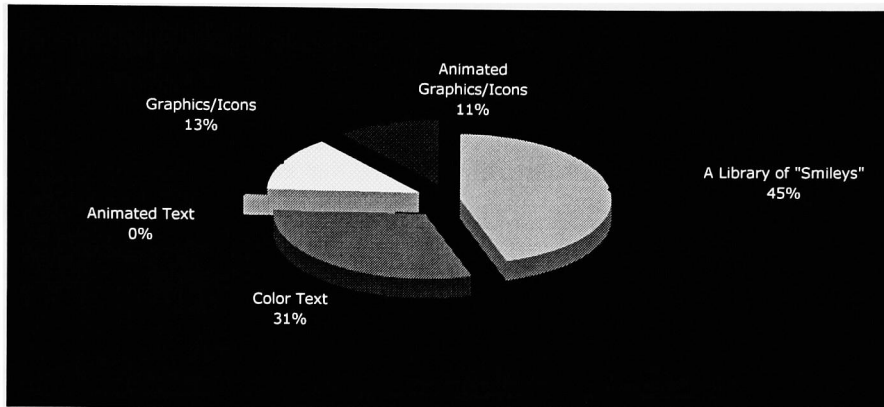
Total Selections: 176

A library of "smileys"(79)	**44%**	
Color Text (53)	**30%**	
Animated Text (0)	**0%**	
Graphics/Icons (23)	**13%**	
Animated graphics/Icons (21)	**11%**	

The users in general have familiarity with color text, a library of smileys, graphics/icons and animated graphics/icons because they are fun to use as opposed to black/white text . They bring friendliness and vividness to GUI because colored text; smileys, icons and animations can better reflect human moods.

As shown, there is no response for animated text since none exists in any arena. The questions above allow me to understand the distribution of Deaf computer users. I looked for relationships between gender, age group, highest grade completed, communication preference, how much time spent per week on the Internet and accessed by the Deaf users use on the Internet to the technological preferences. Most of the respondents are male 57% to 43%. It is possible to assume that the sampling is not evenly gathered or that more males are recruited and trained for higher educational skills than their female counterparts. Unfortunately, it has been commonly known that males in K-12 education are more likely to receive attention and rewards for excelling in mathematical, scientific, and computer skills from their educators.

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[5] http://www.roadrunner.com

Respondents between 18 and 31 tend to use technology more than their elders. Computer age has become more mainstreamed since 1980's, and evidently more people in this age bracket are familiar with computer technology than their precedents. Another possibility is the area of survey when the researcher supplied the respondents the questionnaire in a specific site, limiting the population to this age group. Most of the questionnaire was performed in Raleigh-Durham vicinities. Many of the 18 – 31- year olds-are employed in the high-tech industries of Raleigh-Durham, well known as the Silicon Valley of the East. The highest grade completed among the respondents varied. The respondents who have Bachelors degrees*, 42%, compared to other relatively higher educational attainment groups, 25% goes to high school diploma, AOS and AAS degrees respondents, and then 19% of the respondents who have some college education. This study clearly shows that computer skills are required to have access to computers, this made possible through educational training. *This is a special group with Bachelors with a small percentage within the Deaf Community who responded to the questionnaire.

Most of the respondents are American Sign Language (ASL) users, 76%; the next highest group is 22% Pidgin Sign English (PSE) users, and this is a very low percentage of oral users The high number of ASL users reflect the researcher's own communication preference. That goes to sampling choice; however this is intentional since the primary focus of the users is Deaf. Culturally Deaf and ASL as a primary means of communication users allow researcher to understand their preferences for computer services. Whether the Deaf users rely on facial and color features as incentive for using specific computer features such as a library of smileys, colors, AIM, ICQ, and so on.

It is evident that the most popular computer features used are a library of smiley faces (44%); and colored text. (30%) The other features animated text (0%), graphics/icon (13%), and animated graphics/icons (11%) are not as popular. Possible reasons for strong preferences among those users are on the ability to display emotional and visual enhancements. It could be that the users do not know how to use the other features or do not know that they exist.
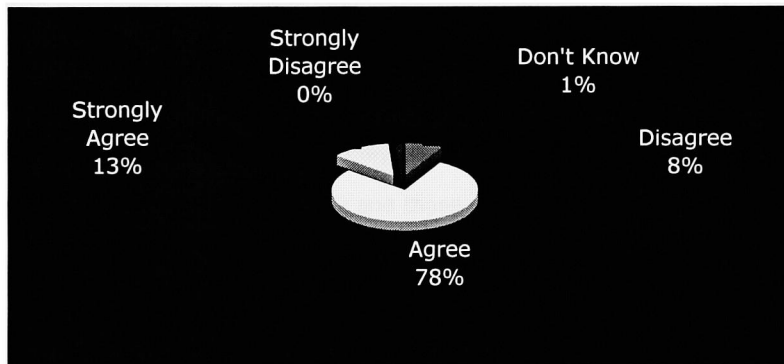
8. If you were given a choice, how would you choose to communicate?
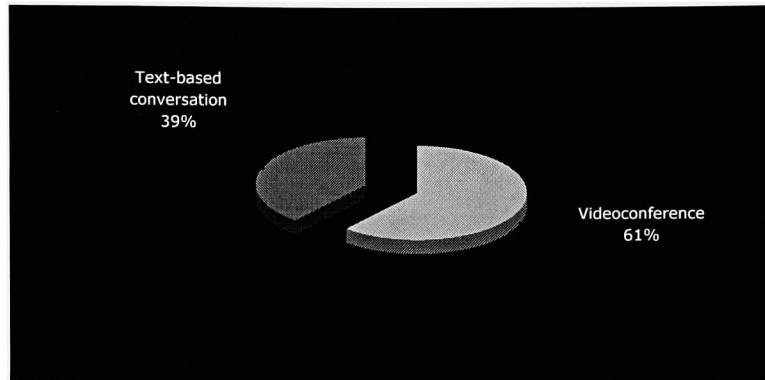
Videoconference (61)   **61%**
Text-based conversation (39) **39%**

The answer is obvious. The users prefer videoconference to text-based conversation because it permits face-to-face interaction in real time.

9. Do you feel that using the Internet chat tools broadens your communication skills using technology?
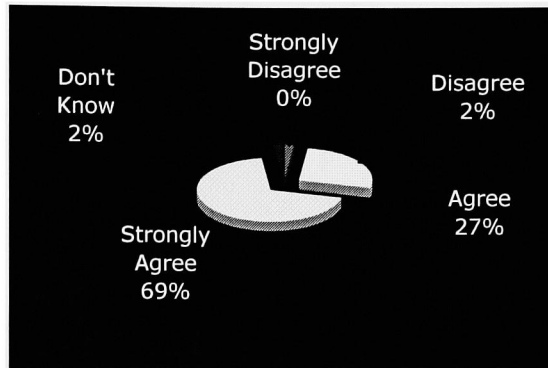

Total Responses: 100

Strongly Disagree (0)   **0%**
Disagree (8)   **8%**
Agree (78)   **78%**
Strongly agree (13)   **13%**
Don't Know (1)   **1%**

Ninety-one percent agree that by using Internet chat tools their communication skills are enhanced. It seems to me that by understanding how to use chat tools we boost the users' confidence and knowledge. This confidence and knowledge empowers them and allows them to advance through the use of technology. Only one percent says they do not know if the skills they have with Internet chat tools have prompted them to feel good about their communication skills.

10. Has using the Internet chat tools increased your ability to communicate with hearing people?
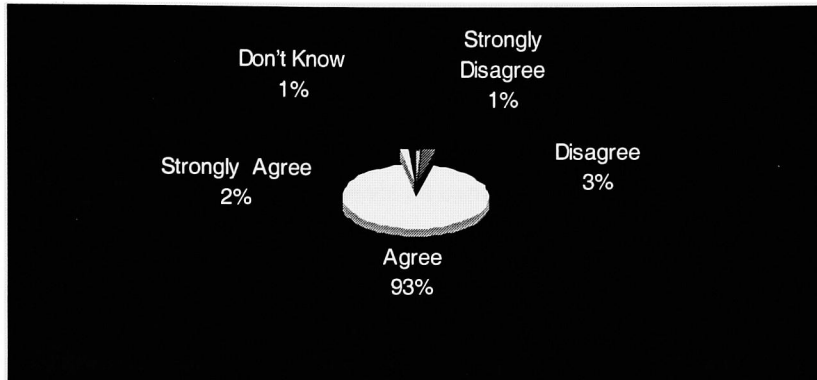

Total Responses: 100

Strongly disagree (0)   **0%**
Disagree (2)   **2%**
Agree (27)   **27%**
Strongly agree (69)   **69%**
Don't know (2)   **2%**

I was surprised to learn that 96% of the users are comfortable communicating with others including hearing users. This is probably due to the lack of language barrier issues. Many Deaf and hard of hearing employ ASL as their first language and English as their second language. I realize that not all hearing users are proficient in English.. It is also true that some Deaf and hard of hearing have a natural aptitude to become proficient in English or have excellent educational backgrounds which lead to better written communications. In regard to educational levels, they apply to all people – Deaf, hearing, blind, and so on. We are all educated differently—both formally and those considered street smart who lack the same amount of formal education or training. Moreover, we must add that we have different backgrounds and this can have an impact on our understanding. We all communicate differently whether hearing or Deaf, dogs, or cats!

11. Has using the Internet chat tools increased your confidence in using online communications?
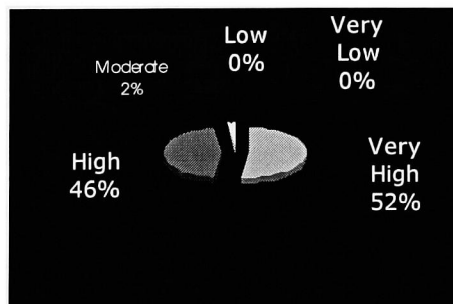

Total Responses: 100

Strongly disagree (1)	**1%**
Disagree (3)	**3%**
Agree (93)	**93%**
Strongly Agree (2)	**2%**
Don't know (1)	**1%**

An overwhelming 95% agree that Internet chat tools have increased their confidence in using online communications. This shows that Internet chat tools break down communication barriers for all people, including those with disabilities. When people interact with each other on line, they are not able to tell who has disabilities or the level of those disabilities If they were to know who they are, communication barriers would be bound to happen. Hence, Deaf/hard of hearing users' confidence is almost off the chart as a result of using chat tools online.

12. Has Internet enabled you to increase your independence?

Total Responses: 100

Very High (52)	**52%**
High (46)	**46%**
Moderate (2)	**2%**
Low (0)	**0%**
Very Low (0)	**0%**

Within hearing society, Deaf people often tend to be more dependent on others. However, if we are on line, we can find information or ask for help without feeling patronized which gives us a greater feeling of self-worth and independence.

Since the inception of the Computer Era, Deaf users have found it is very useful and efficient to be on their own using the Internet because they experience no barriers to their progress.

12. **In general, how would you rate your overall level of independence?

**
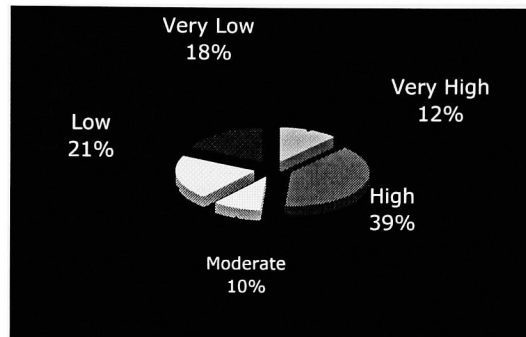
Total Responses: 100

Very High (12)	**12%**
High (39)	**39%**
Moderate (10)	**10%**
Low (21)	**21%**
Very low (18)	**18%**

**I realize this question is too broad; it resulted in open-ended responses. It was supposed to be a rate of overall level of independence using Internet chat tools. The results are therefore neither accurate nor helpful to my study.

The above questions 8 to 13 deal with understanding the relationship between technological communication and levels of independence. Question #8 indicates that 61% of respondents prefer videoconference while to 39% prefer a text-based mode. It could be that ASL users prefer the visual-spatial language, which is easier to do via videoconference. Although it is true that most of the respondents have some college education, they still prefer eye contact in order to read moods instead of having to infer mood from the text. 39% prefer text-based, and it is probably because they are bilingual and want to use the English language to have broader access to the world. 78% of the respondents agree that using Internet chat tools broadens their communication skills. 8% say they disagree. It may be that those 8% can speak and hear the phone to interact with the hearing people as well as using their sign language with their Deaf counterparts. This needs further research.

Another interpretation of this could be from their resistance to Internet chat tools that give them access to communication. 13% of the respondents strongly agree and it is possible that they feel empowered and more independent to do what they want without being discriminated against when ordering resources, conversing with other people, and researching independently.

69% of the respondents strongly agree that using Internet chat tools increases their interaction online with hearing people. This is to be expected since chat tools are text-based and different kinds of people can have the world at their fingertips through e-interactions at any time.

93% of the respondents agree that using Internet chat tools increases their confidence in online communication. Naturally, using online communication frees Deaf users from depending on relay service (over the phone) or hearing parents, siblings, or co-workers to place orders or make some follow-up calls or make appointments with medical personnel. Now, Deaf users can do what they want at their own convenience. That ability brings confidence and comfort in knowing they can do whatever they want whenever they want without pressuring themselves or others to do things for them.

Internet usage enables Deaf users to have independence. An overwhelming 98% say that their level of independence has increased because of the technology. For my interest in understanding how Deaf users rate their overall level of independence, 12% say very high, 39% say high, 10% moderate, 21% say low, and 18% say very low. These scores differ from question #12 because the users say Internet chat tools improve their level of confidence. It could be that their daily social interaction limits their ability to express their thoughts and feelings freely, whereas the computer allows them full verbal expression as indicated by the positive relationship between the use of Internet chat tools and the level of confidence.

14. Is it easy for you to know when a new message comes in?
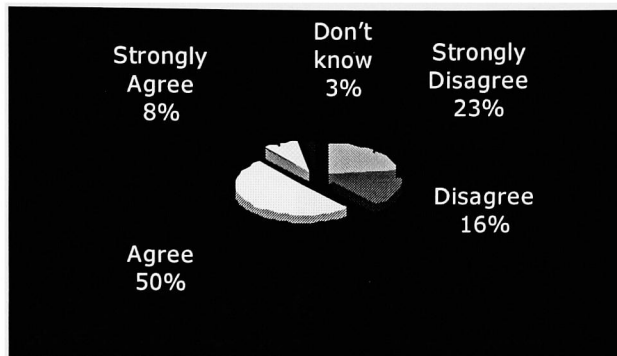
Total Responses: 100

Strongly disagree (23)	**23%**
Disagree (16)	**16%**
Agree (50)	**50%**
Strongly agree (8)	**8%**
Don't know (3)	**3%**

The majority of the responses tend toward agreement58% agree Usually, hearing users know when a new message comes in is because of the auditory sounds available to them.

Generally, Deaf/hard of hearing have no problem in recognizing when new messages come in because of the blinking cues. Blinking new message boxes are similar to auditory sounds. The groups of both Deaf and hearing users have to respond to the blinking visual/continuous auditory sounds until they click on them to cause the blinking messages and/or continuous sounds to stop. . However, If more than two new messages are coming in, this is the perfect way to get lost due to the confusion of tracking message deliveries.

15. Are you aware that every time a message pops on the screen it makes a beeping sound?
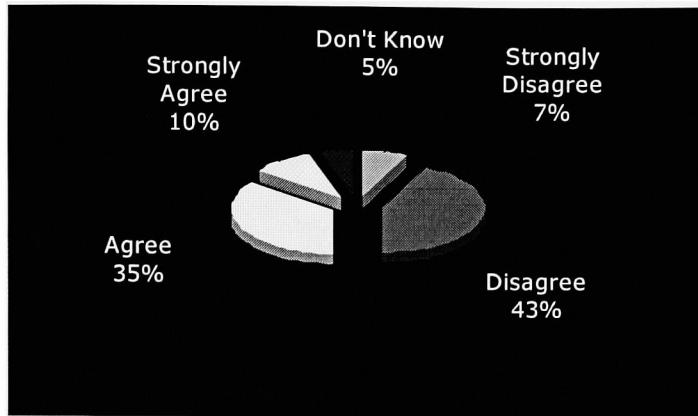
Total Responses: 100

Strongly disagree (7)	**7%**
Disagree (43)	**43%**
Agree (35)	**35%**
Strongly agree (10)	**10%**
Don't know (5)	**5%**

Half the people who responded to the Website questionnaire did not realize there was a beeping sound option in their AIM program. The seven participants from the roundtable discussion at my home were unaware of the sound. I showed them what it was on my computer and they reacted negatively as if they were dismayed or misinformed of a tool: beeping sound. Beeping sounds occur when a friend logs on or leaves AIM, or sends a message to another user.

** Please note: This question is less significant in this study because the questions number 3 are similar to question number 4.

16. How easy is it to detect "tone of voice" of message from the person you are talking to?
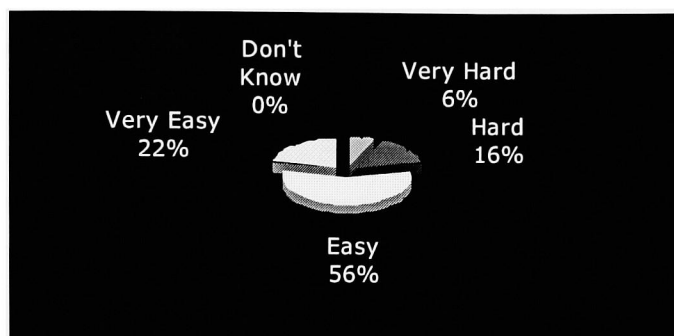
Total Responses: 100

Very hard (6)	**6%**
Hard (16)	**16%**
Easy (56)	**56%**
Very easy (22)	**22%**
Don't know (0)	**0%**

The results surprised me because I did not expect the vast majority would respond "easy" to detect "tone of voice" of message because often words can be misleading, especially for Deaf/hard of hearing users. Deaf/hard of hearing users rely heavily on visual or facial expressions to get messages solidly rather than the text.

Twenty-two percent of the users reported difficulty in detecting the tone of the message. This is why the library of smileys is popular, because it brings more human feeling online than just the use of text.

The section above is about whether the Deaf users are familiar with the visual and auditory sounds produced from Internet chat rooms or whether they can read text-based conversations. Hearing ears have been trained for those highly distinctive sounds, but do the Deaf ears detect changes in chat rooms or are they aware of the changes in tone? When question #14asked if was it easy to know when a new message came in, 23% said they strongly disagree. It could mean that the new message does appear covertly on the screen or they do not realize that they can make it more visible. 16% say they disagree. I assume that the reasons discussed are more likely to be the same for the strongly disagree group.

Half of the respondents do not know that when a new message comes in, they make a beeping sound. Perhaps they believe that the beeping sounds do not exist. The responses to this question reflect the need for upgrading technological services to provide equal services for all kinds of people.

New Internet visual tools are needed to accommodate their inability to access auditory cues. Of the 45% who say they are aware of the beeping sounds,. they could be told by hearing counterparts that when someone comes in, they make a sound, or they may have sufficient hearing to know, or they could be making an educated guess or when the question, #15 asks, "Do you know that every time a new message pops on the screen, it makes a beeping sound?" it gives away the answer that it does, in fact, produce a beeping sound when a new message comes in. Perhaps some of the respondents would like to answer that they never knew, but want to say they know it. It could be because they take pride in computer knowledge.

Question #16 asks respondents if they know how to detect the tone of voice of a message when engaged in e-chat. Both groups, Very Hard and Hard to detect groups, totaling 22% say they have a difficult time detecting or reading between the lines. It could be because English is their second language. It is hard to understand the depth of a language one has never heard, let alone reading that language for comprehension. 72% of respondents say it is easy to detect the tone of voice of the message. This is probably because most of the respondents are educationally trained in English.

17. How do you feel about auditory attention getting signals?
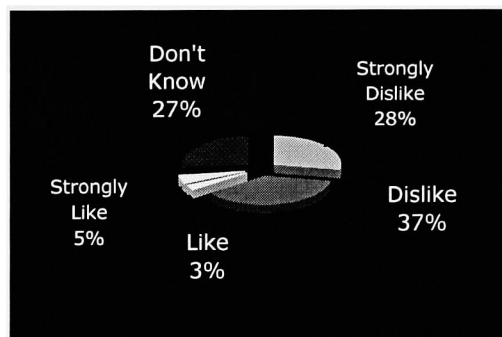
|	
Strongly dislike (28)	**28%**
Dislike (37)	**37%**
Like (3)	**3%**
Strongly like (5)	5%
Don't know (27)	**27%**

65% of respondents do not like auditory attention-getting signals. Perhaps, it is because they feel they should have the same access as hearing users to the Internet chat tools.

All people using the Internet should have equal access to information. This information may be presented differently to reach a variety of people with various backgrounds. Some people already knew

there are auditory attention getting signals but they choose not to listen to the sounds. Another possibility is different levels of hearing.

Many factors are involved in the production of goods and services. These same factors impact the tools currently available. If we hope to enhance enjoyment and increase understanding of products we must seek to make them universally understandable. We must seek a better method of providing access to those unable to experience auditory signals. They are being denied total usage of Internet Conferencing Tools. This group is better known as Deaf or hard of hearing. The same materials that will serve to provide this group with better communication capabilities will increase awareness and knowledge within the hearing community. We all will benefit from better methods of communication.

18. Do you feel that the overall usage of Internet chat tools is designed for hearing?
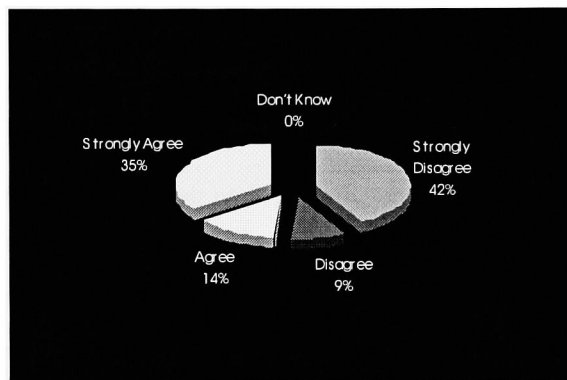
Total Responses: 100

Strongly disagree (42)	**42%**	
Disagree (9)	**9%**	
Agree (14)	**14%**	
Strongly agree (35)	**35%**	
Don't know (0)	**0%**	

Respondents are divided almost evenly between agreement and disagreement. I believe the reasons for these results are because of one major feature of the chat tools: auditory sounds. It looks to me as though the Deaf/hard of hearing users are more focused on the auditory sounds than they are on the library of smileys.

I think this focus by Deaf respondents on the auditory material is due to a lifetime of awareness of sound and sound enhanced materials without the actual experience of sound. For example: I know that water dripping makes a sound because I have been told by this those who can hear and I trust them to tell me the truth.

Many Deaf persons come from hearing backgrounds and likely have similar stories to tell regarding sounds they cannot hear but are made aware of by hearing folks. This awareness of auditory cues must permeate the world of the Deaf. However, an awareness of sound is not the same as the actual experience.

Questions 17 and 18 are about subjectivity, since I was interested in how Deaf users perceive the computer in general. It is text-based (most of the time) and it has voice recognition for those who want to use voice instead of the keyboard to convey and acquire messages, and the language is English. It would be impossible to use ASL to distribute information on the Internet because it does not have a generally used written form. That is why I want to understand the other parts of the responses, which could give more reasons for expanding resources to provide access for Deaf users. Question 17 asks respondents how they fee about auditory getting signals. 65%say they dislike the feeling that this is auditory-based, which is designed for hearing users, excluding them from having 100% access to the Internet.

Only 8% say they liked the auditory basis; perhaps again it could be they have some residual hearing. They are aware of the sounds and are part of the hearing communication loop on the Internet. Surprisingly, 27% say they do not know how they feel. It could be that they deny that part of their Deaf experience because of the rejection and exclusion issues they are very familiar with, and to protect those Deaf experiences, they have to distance from the larger society, the hearing society, by saying they do not know. This could become an interesting project someday, to see how Deaf users negotiate their Deaf experience on the Internet. Clearly, this provides a good reason for further research.

The next question, #18 asks respondents "Do you feel the overall usage Internet chat tools is designed for hearing?" It is not an appropriate question, but I was interested in how Deaf users feel about the overall usage of the Internet and whether they are for hearing users or for the wider populations. About half feel that the Internet chat tools exclude some people. The other half feel the Internet chat tools are inclusive regardless of their hearing status. These strong oppositional groups clearly demonstrate deep divided attitudes and expectations of how the Internet chat tools do limit or not. One way or the other, this deep divided attitude whether the Internet chat tools are designed for hearing people goes beyond computer issues. It stems from social experiences, which have brought divisions between those respondents. What struck me is the disparity between this question and the earlier questions, #16 "How easy is it to detect "tone of voice" of message from the person you are talking with?"

There were no respondents who say they cannot detect the tone of the voice, yet when they are asked how they feel about auditory signals (Question 17), 27% say they do not know how they feel. Question #16 indicates that the respondents dodge the question about how they feel that the Internet does provide auditory signals and this is in contrast to how they feel about whether the Internet chat tools are designed for hearing users. A quarter of the responses indicate some opinion ranging from strongly dislike to strongly agree about the services the Internet chat tools provide for hearing people. This contradiction clearly underlines antagonism. It is better to avoid confrontation with their thoughts about Internet chat tools. They must acknowledge their ability to hear the beeping sounds. They willingly face the overall mechanism of Internet chat tools as hearing-oriented. This further proves discrimination against them. It is and uncomfortable feeling of being on the outside.

19. As a sign language user are you more comfortable using videoconference compared to using text-based conversation?
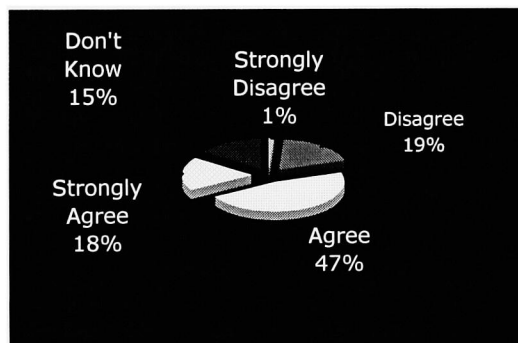

Total Responses: 100

Strongly Disagree (1)	**1%**
Disagree (19)	**19%**
Agree (47)	**47%**
Strongly agree (18)	**18%**
Don't know (15)	**15%**

**This is a less significant question because videoconference is not super-quality as it is with text online. Videoconference depends on the quality and speed of cable modem.

If yes, do you think adding more visual features to text would make it as good as videoconference?
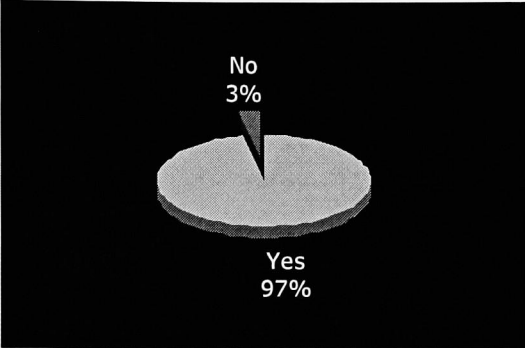
Yes (63)   **63%**
No (2)   **2%**

Obviously, videoconference stands out in this category because it is real-time chat. Videoconference is not always reliable, as I mentioned earlier, and depends on the speed of cable modem. Both parties using videoconference must have hardware and software installed on their machines to have a real time chat.

I wanted to see if the respondents feel more comfortable using videoconference compared to using text-based conference. The strongly disagree and disagree groups, totaling of 20%, say they do not feel comfortable whereas agree and strongly agree groups, totaling of 66%, feel more comfortable using videoconference over text-based conversation. Most of the respondents have some college education and they prefer to use face-to-face interaction rather than to use texts for communication.

Summary of Results: The Website Questionnaire

100 respondents completed the questionnaire. The number of hours the average user spends on the Internet per week is more than 20 hours (18%) and the second largest group was under 5 hours (24%). The primary purposes for using the Internet is e-mail, chat room and Internet surfing.

More of the respondents were male and they came from a diverse background with varied educational levels. The largest age group that did the survey was 25-31. They range from PSE to ASL; none come from Oral or Cued Speech backgrounds. They were generally satisfied with AIM and its features even though they did not feel that the AIM software applied to them. They thought it was for hearing users.

Half the users agree that they know when the new message comes in. This compares to 23% that say they strongly disagree about the new messages coming in. These are the comparisons that show two different groups that agree and strongly disagree about messages coming in. They admitted that the usage of the Internet has enhanced their independence and increased their communication skills. This helps to eliminate communication and language barriers for the users.

I did get the impression that the respondents felt I could add other issues to my future surveys. Some indicated they had materials they would like me to incorporate. For example, some respondents were concerned with the color of the text or background that creates visual barriers for people who are colorblind.

Summary of Results: The First Roundtable Discussion

The beauty of having the questionnaire set up on the Website is that it can reach different people all across the country. I am pleased with the results because I have better insights concerning how to proceed with my workable prototype. I am better able to determine how it is applicable to them regardless of their educational or communication preference background. It is my hope that the users from different backgrounds feel comfortable with my future prototype and its simplicity.

I collected and analyzed the findings of the questionnaire that the Deaf participants completed (see Appendix B, page 50). Then I summarized the overall findings of the study to indicate the degree to which technology is partly responsible for the gap between the Deaf and the hearing society. Following that night, I began working a 4-question survey narrowed questions (see Appendix E) and prepared an IM demonstration for those who came to my home. I asked my sister, Jilly, who is a graduate student at American University in Anthropology, for her opinion and editorial view on my roundtable 4-question and IM demonstration.

I invited seven people to my home and I provided them with free pizzas and sodas. Afterwards we gathered around my dining table. I prepared seven copies of the roundtable questions for each once they sat at the table. I asked them not to peek at the questions, as I wanted them to be able to concentrate on one thing at a time because I did not want them to be confused with the questions nor to lose their concentration if they had seen the questions after the first roundtable question.

I thought it would be best to include all seven Deaf/hard of hearing users in one roundtable table group for comparison in differences and similarities using e-mail, chatroom, AIM, and ICQ, because the results would be different if the roundtable participants were all Deaf. See below for result summaries:

As for weaknesses and reasons, the common responses to **Wyndtell** were:

- Poor coverage
- No copy & paste features
- Bad customer services
- Real time chats are slow

Wyndtell's strengths:
- Great e-mail communications
- Convenience
- It is like cellular phone that hearing people use
- Independence

As for weaknesses and reasons, the common responses to **Chatroom** were:

- Limited address book
- Oftentimes, strangers get into chatroom without permission
- Can't tell one's mood using Chatroom

Chatroom's strengths:

- Able to communicate with individuals from diverse backgrounds
- Can print conversation
- Easy to use
- Meet new friends in chatrooms

As for weaknesses and reasons, the common responses to **AIM** were:

- When a new IM is sent to me- I have to be conscious of it
- No real time chat option

AIM's strengths:
- Free long distance calls!
- Not memory hogging like ICQ
- Easy to use and communicate privately with one individual
- Minimize AIM's windows

As for weaknesses and reasons, the common responses to **ICQ** were:

- Too big application
- Too complicated to follow steps
- Bad instructions
- Poor and unstable connection for real time chat
- Too many features

ICQ's strengths:
- Loaded with useful features
- Great tool on PC
- Cheaper than long distance calls

My coworker, Dave Binning brought up the idea of adding a visual animated library of smiley faces. I asked Dave about the possible new features of the library of smiley faces, but he suggested animation to the visual tools. This is when I realized that IM visual animation is invaluable; therefore, this area of pursuit is being investigated further for a possible workable prototype. My initial interest was the accessibility for Deaf/hard of hearing users of IM chat tools. However, after this conversation I became interested in the possibility of adding visual animation to IM.

I appended the following question to the roundtable discussion. 5) What do you think about adding a visual animated library of smiley faces using face and hands?

My research has added a new library of smiley faces with visual animation to IM chat tools in order to improve accessibility for Deaf/hard of hearing users. See Figure 2 for the AIM library of smiley faces:

Figure 2: The current library of smiley faces on AIM[6]
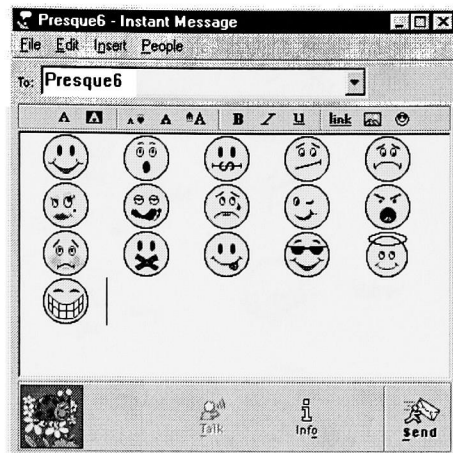
There are 16 icons; these are the components the AIM users have on their machines. one can easily click the icon I find best fit to express myself in conversations I have with my friends online. The faces are universal and everyone understands what they mean. Figure 3 shows an example of the animated faces with sign language that I discussed with my coworker Dave Binning:
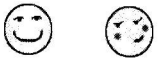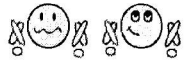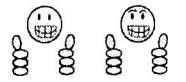
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[6] www.aim.com

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Figure 3: A proposed new smiley face visual animation library
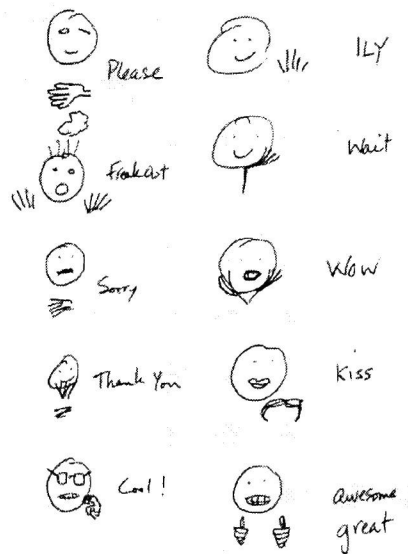
The figures are for comparison of both the current and proposed smiley faces. Note that the current library does not have the ASL components, which are vital for visual communication among Deaf/hard of hearing users as well as for hearing users. The new library has several important functions: eyebrows, the use of hands, the movement in facial expression and gesture, signing, and added text words for educational purposes.

It was brought to my attention that this workable prototype was not possible because it was not universal and not everyone understands or can figure out what the faces mean. Therefore, it was not marketable. Another strategy that was acceptable to everyone was to develop a concept using faces with hands that are accepted at an international level or cross-cultural communications -- see the following figure 4:

Figure 4: Proposed Workable Prototype

Visual Animation   Emotions/Meanings

→ Blush

→ Bored/wait

→ Freak out

→ Hope
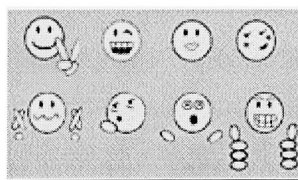
→ Kiss

→ Peace

→ Thumbs Up

→ Wink

The AIM Box "Works"

In Figure 5, AIM box, 5A is the place for chatroom between two users or more that consists of text, font, image, file transmission, etc[7]. The proposed prototype, figure 5B, is to add animated images to the still-image to enhance visual messages. They bring more interactions to the users.

5A.
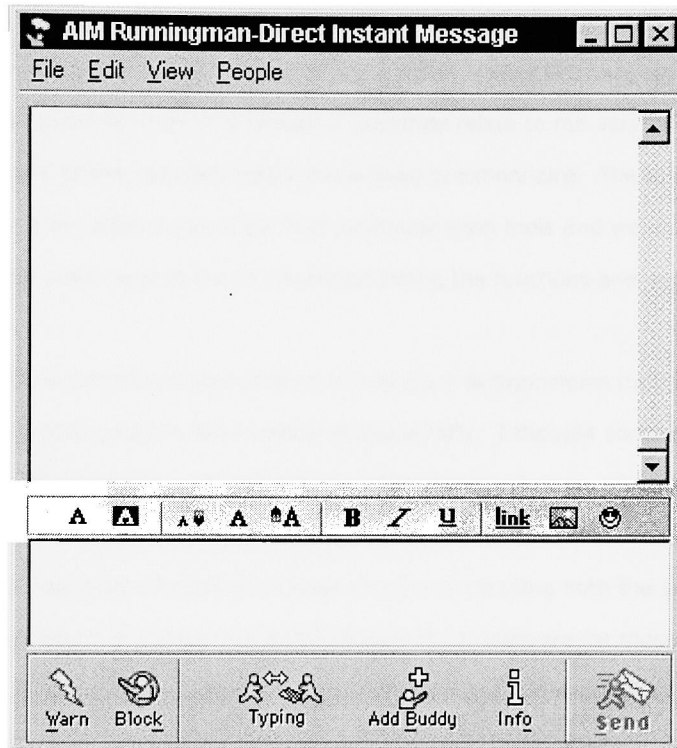
5B.

---

[7] www.aim.com

Limitations of the Website Questionnaire

Some of the questions turned out to be irrelevant. They were not related to the focal point of the study. Some were open-ended questions or too broad-based.

Summary of Results: The First Roundtable Discussion

The participants were ready and to share their input about how to improve communication accessibility. I suspect the reason for their enthusiasm is that they relate to me very well on this topic. We had an open question and answer session before the written questionnaire. The terminology was not familiar to all of them. There are differences in the four communication tools and we examined them to be sure that we all were on the same page in terms of understanding the functions and applications.

The participants drew different smiley faces with one word to brainstorm their ideas on what could be used as a smiley face in possible future visual animated IMs. I thought some of those smiley faces were very important. For example, one smiley face, with raised eyebrows, mouth slightly open, index fingers moving upward in the air in a single motion: ASL translation: "PAH!" It has a great cultural significance. That feedback has made me think seriously about incorporating both the sign and cultural tones in some of the smiley faces. In the current smiley library the sounds are for those who can hear and will know whether users have entered or exited the chatroom. I believe it is important for Deaf and hard of hearing users to have the same access with different and unique sensory enhancements. Hearing people could also benefit from these enhancements.

Limitations of the First Roundtable Discussion

The only limitation regarding the first roundtable discussion was the number in attendance. It would have been better to have a 10-participant panel because I would have a better insight on how to improve the concept and development of a prototype. I believe if I had an additional three people I would have received more feedback and thoughts on the roundtable discussion and prototype.

Summary of Results: The Second Roundtable Discussion

The second roundtable discussion took place on November 10, 2000 in my home. I provided the same group members with pizza and soda to show them my appreciation for the time they had devoted to my study. The group got together in my den where my computer is situated so that they could actually view the prototype.

I had a lot of positive feedback about the prototype. The participants really liked the idea. The only concern they had was the copyright issue with AIM that originally created the AIM box. I explained to them that I already gave them the credit when they are due in my paper and that I would mention it again in my thesis defense. I added only the AIM animated images onto the original AIM box.

Some of the participants asked me how I had made the animated images and I explained to them that I used Macromedia Director 8 to create them. I showed them the Director program. I also used Adobe Photoshop 5.5 to make a library of smiley faces similar to the original ones seen on AIM.

The participants were satisfied with the color of the AIM background, the placement of the AIM images, and the AIM images its color background. All participants agreed that the prototype exceeds their expectations and encouraged me to bring this to the market to help not only Deaf/Hard of hearing users, but also everyone else.

Limitations of the Second Roundtable Discussion

The feedback I got from the participants was positive. I did not get any suggestions as to how to improve the prototype. They wanted to leave it the way it is set up because it is clear and structured. I know that the prototype is acceptable, but I know the gesture as seen on the animated images are not universal, or cross-culturally acceptable because the images (gestures) can mean different things in some countries. Hence, this project is limited to the USA.

Conclusion

This work is a preliminary investigation of issues related to Internet chat tools focusing on Deaf users. It has clearly documented the issues and needs. I hope to upgrade and promote 100% accessibility for those members of the Deaf community involved with Internet communication and exploration.

Deaf people are too frequently isolated from the very communities in which they live on a daily basis. This isolation may cause a lessening of self-esteem along with lagging behind educationally, socially and technologically.

Today the use of the computer has opened up a completely new world for the Deaf as it has all for others. This includes playing games on the Internet and advanced communication tools. The Deaf are not being included in every aspect of the communication tools that are available for people in general. By making Internet tools more users friendly to the Deaf we will be on a more level playing field and capable of advancing as far as our skills take us.

Summary of Recommendations for Further Action

The researchers and developers of Internet chat tools services and products should market new or upgraded telecommunications services to people who are Deaf or hard of hearing. This is my interpretation based on the information gathered and documented. These are my recommendations for improvements on Internet chat tools to the researchers and developers 1) The Internet chat visual tools should be animated to improve the value of the message conveyed, and 2) Improved visual tools offer all users a better chance to be understood by all.

It is my hope that my prototype will be passed on to the next person who is interested in pursuing this work further. It still needs many refinements such as more animated images that are universal or cross-culturally accepted. The proposed prototype with future research by the next person is what I believe will be succeed in the market for all kind of people regardless of their differences in communication styles, disabilities, levels of hearing, and social status.

The prototype is an introductory toolkit for all people. It is advantageous to have not just the text, but also the visual facial smileys for opening up the imagination. It is important to acknowledge that people have both left and right hemispheres of their brains; the left side of the brain is known to work with language, and the right side of the brain is about vision. The former is common through computer text and written literature. The text is about reading comphrension and exclusive, whereas the latter is about visual tones and almost universally understood.

Appendix A

The Questionnaire is targeted for Deaf and Hard of Hearing audience. The results will enable me to conduct my study on how the Internet chat tools have impact on the Deaf and Hard of Hearing messaging users.

Question #1 — Please indicate number of hours you spent using the Internet per week: 1-5 — Vote! / Results

Question #2
What purpose(s) do you use the Internet for: (mark all that apply)
- E-mail
- Chatroom
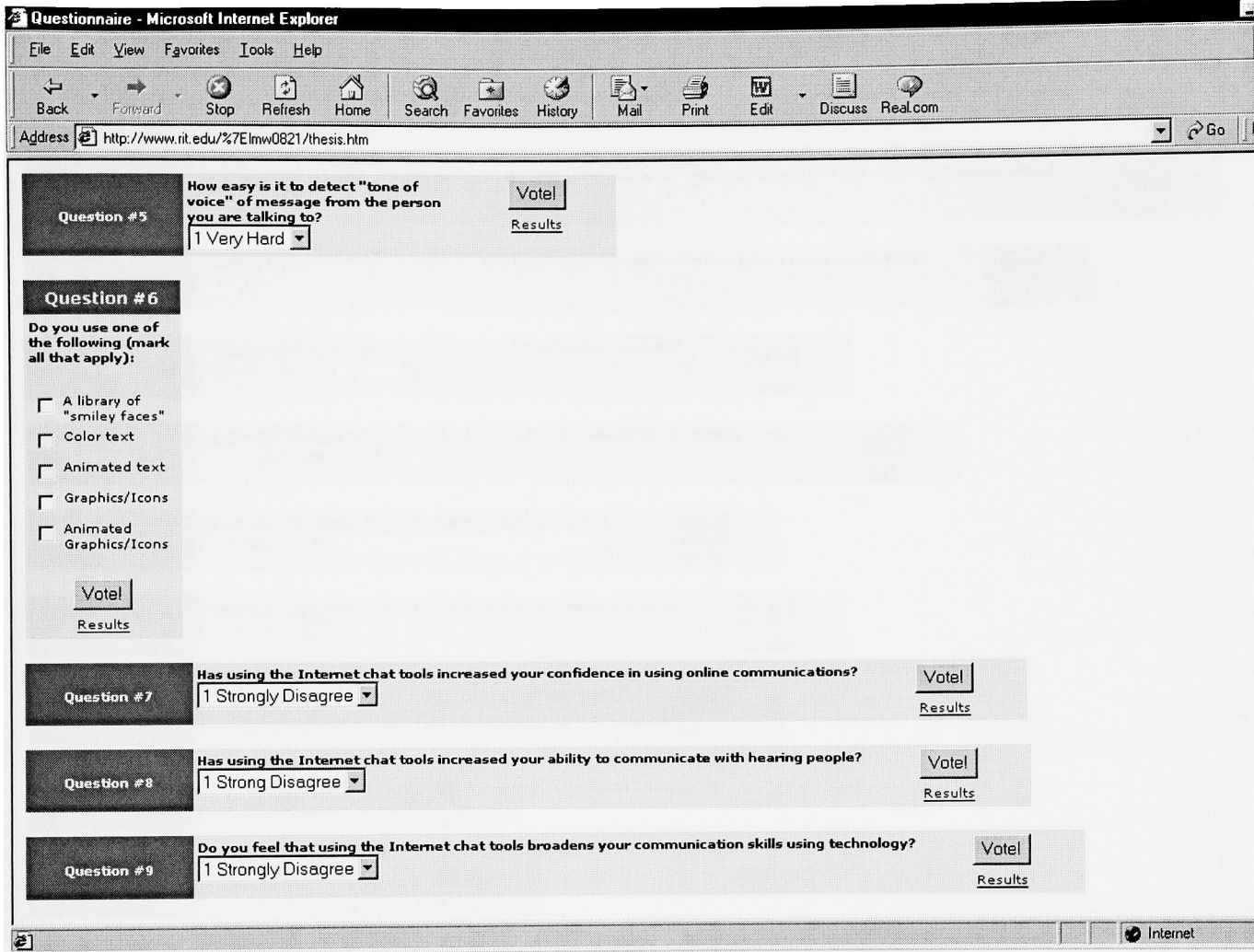- AIM
- Internet
- Videoconference
- ICQ

Vote! / Results

Question #3 — Is it easy for you to know when a new message comes in? 1 Strongly Disagree — Vote! / Results

Question #4 — Are you aware that every time a message pops on the screen, it makes a beeping sound? 1 Strongly Disagree — Vote! / Results

Freepolls: www.rit.edu/~lxk3117/msthesis.htm Question #1-4

Questionnaire - Microsoft Internet Explorer

File   Edit   View   Favorites   Tools   Help

Back | Forward | Stop | Refresh | Home | Search | Favorites | History | Mail | Print | Edit | Discuss | Real.com

Address http://www.rit.edu/%7Elmw0821/thesis.htm   Go

Question #5

How easy is it to detect "tone of voice" of message from the person you are talking to?

[1 Very Hard ▾]

Vote!

Results

Question #6

Do you use one of the following (mark all that apply):

☐ A library of "smiley faces"
☐ Color text
☐ Animated text
☐ Graphics/Icons
☐ Animated Graphics/Icons

Vote!

Results

Question #7

Has using the Internet chat tools increased your confidence in using online communications?

[1 Strongly Disagree ▾]

Vote!

Results

Question #8

Has using the Internet chat tools increased your ability to communicate with hearing people?

[1 Strong Disagree ▾]

Vote!

Results

Question #9

Do you feel that using the Internet chat tools broadens your communication skills using technology?

[1 Strongly Disagree ▾]

Vote!

Results

Internet

Freepolls: www.rit.edu/~lxk3117/msthesis.htm Question #5-9

Freepolls: www.rit.edu/~lxk3117/msthesis.htm Question #10-17

<u>Reasons for Questions Developed on the Web Site:</u>

1. Please indicate number of hours you spend using the Internet in a week:

I needed to know how many hours the users spend using the Internet. The more time they spend on the Internet the more ammunition I will have to convince the software developers to add animated smiley faces.

2. What purpose(s) do you use the Internet for: (mark all that apply)

- ICQ
- Email
- AOL
- AIM
- Internet
- Chatroom
- Videoconference

It is important to include this question because the purposes of using the Internet helps me to see which tools the users prefer.

3. Is it easy for you to know when a new message comes in?

The question has relevance to the awareness of the new message coming in because the current AIM incorporates beeping sounds. A few messaging systems have "visual" beepings. This helps me to implement and improve a new messaging system that strongly involves "visual" cues such as a blinking screen.

4. Are you aware that every time a message pops on the screen it makes a beeping sound?

This question supports the question #3. It is important that the users/customers know their service and what is available to them. Every user should have equal access to the service.

5. How easy is it to detect "tone of voice" of message from the person you are talking to?

The messaging system has features such as bold, italic, underline or uppercase letters to visually show the tone of the sender's mood. Users share language in spite of the difference of the culture and should reflect their language in parallel to their "tone of voice".

6. Do you use the following:
   * Graphics,
   * Graphics/Icons,
   * Animated Text,
   * Color text,
   * Animated Graphics/Icons,
   * A Library of "Smileys"

I needed to know what features the users used the most for their messaging system. It helped me as I created the AIM prototype. The AIM prototype was based on the users' demand of features they use for the Internet chat.

7. Has using the Internet chat tools increased your confidence in using online communications?

Deaf and hard of hearing people use phone systems to connect with their loved ones, friends or doctors either by TTY-to-TTY chats or via State Relay. This technology has changed over the past decade and phone systems have changed as well. Deaf and hard of hearing users prefer using Internet (e.g., Microsoft Outlook) to keep their correspondence with doctors, for example, to make appointments, or even ask questions online. Therefore, their dependence on using the Relay has been reduced greatly because of the availability of the technology that allows them to be independent with their calls/email correspondence online.

8. Has using the Internet chat tools increased your ability to communicate with hearing people?

This question connects with question #7.

9. Do you feel that using the Internet chat tools broadens your communication skills using technology?

Internet chat tools allow ASL users to be exposed to various terminology and subjects; therefore, visual and text production reinforces creativity in communication.

10. As a sign language user are you more comfortable using videoconference compared to using text-based conversation?

Videoconference is highly desirable for those whose language is limited to ASL. Visual interaction embodies expressive, context, text, and abstract, which is not always possible through text-based conversations among ASL users.

11. If yes, do you think adding more visual features to text would make it as good as videoconference?

The features expand visual stimulation for those ASL users who engage strongly in more expressive discourse because spatial-visual components are vital to ASL.

12. If you were given a choice, how would you choose to communicate?

I was curious to learn what kind of communication the Deaf and hard of hearing community would choose if they were given choices between Videoconference and the text-based conversations. This helps me to see if they prefer in-person chat or the real-time conversations.

13. Do you feel that the overall usage of Internet chat tools is designed for hearing?

The Internet is a multimedia landscape, which allows different interested groups, like ASL users, to participate in specified sites to their liking.

14. How do you feel about auditory attention getting signals?

Auditory attention getting signals could be modified to visual attention signals so the Internet would be inclusive to all.

15. In general, how would you rate your overall level of independence?

The question is an open-ended question for their response. It was supposed to be a rate of overall level of independence using the Internet chat tools. The results are neither accurate nor helpful to my study.

16. What is your gender?

Gender issues and communication styles differ or not, and how can the proposed mechanisms integrate both groups on the same leverage.

17. What is your age group?

Understanding ASL users' age could enhance further studies in Art, Language, music, and communication Arts and how they benefit the Internet on the whole.

18. What is your communication preference?

Analyzing communication preference will help with improving services for specified language users in the hearing-impaired population.

19. Mark highest grade completed:

Educational attainment might have a tremendous impact on interactive communication on the Internet.

Appendix C

Greetings from Cary, North Carolina!

In order to complete my Master's studies at Rochester Institute of Technology, I need to do a thesis. The primary audience in my thesis is the Deaf and Hard of hearing population. I will focus on how Internet technologies affect them and daily surroundings in their lives.

You may be thinking, "What can I do for you"? All I need is approximately ten minutes of your time to fill out a questionnaire. The questionnaire will enable me to find results of the study. If you are interested in the results, I will be more than happy to provide you the results. Please click on my web page: http://www.rit.edu/~lxk3117/msthesis.htm. This will lead you to the Questionnaire. From there, you can mark the most appropriate answer that is the best fit to you.

Thank you for your time.

With appreciation,

Lee Kowalsky

Appendix D

<u>First Roundtable Questions</u>

22 September 2000

Roundtable Discussion

Introduction
Introduce each other.

Purpose
Explain the purpose of my thesis and the study.

Remind them that no answers/opinions are right or wrong.

How does this Roundtable work?
A distribution of Roundtable sheets will be given to you individually.
Feel free to ask me questions for clarifications.
You can work on the Roundtable questions individually or in a group.

Introduction to Research Questions:

12. What are the pros and cons of newer technologies such as Wyndtell, Chat, Instant Messaging and ICQ systems? Please supply your views on each one of these chat tools on the next page:

Question #1

	Weaknesses and Reasons:	Strengths and Reasons:	Suggestions/ Comments
Wyndtell			
Chatroom			
AIM			
ICQ			

How do the Internet conferencing tools have **impact** on their Deaf messaging clients? Please list your views on each one of these chat tools below:

1) Wyndtell:

2) Chatroom:

3) AIM:

4) ICQ:

Question 3: For example: Based on the Website questionnaire survey, the participants vote 7% on using ICQ? See below for data comparison:

Q1: Curiously, AIM has a library of smiley faces, but not on chatroom, what is your interpretation of this discrepancy?

E-mail (43)	**25%**
Chatroom (43)	**25%**
AIM (24)	**14%**
Internet (43)	**25%**
Videoconference (4)	**2%**
ICQ (12)	**7%**

 Total Selections: 169

What do you think? Your comments here:

1. Where did you learn how to use computer? (Mark all that apply)
   a. Residential school
   b. Mainstream
   c. Oral
   d. Public
   e. Private School
   f. Private tutor
   g. Friends
   h. Work
   i. Other: _____

Name:_____

Thank you!!!!

Appendix E

	Weaknesses and Reasons	Strengths and Reasons	Suggestions/Comments
Wyndtell	**User #1** • Poor coverage in many areas • No copy & paste • Pager to TTY connection is bad	**User #1** • Great e-mail communication • New Instant Message • Once have it- cant live without it!	**User #1** • Better coverage or better wireless system
Wyndtell	**User #2** • Signal depends on access to radio tower • Does not always work if in rural areas coverage in many areas • No copy & paste	**User #2** • Able to communicate independently at areas away from computer/phone • Ideal for emergencies	**User #2** N/A
Wyndtell	**User #3** • Customer services • Coverage • Relay & TTY chats are too slow!! • Long delays delivery of e-mails	**User #3** • Convenience • Simplicity • Easy to access to forwarding to PC • Address book •	**User #3** N/A
Wyndtell	**User #4** • Coverage • TTY chat traffic is not smooth • Miss pager vibrations sometimes •	**User #4** • "Anywhere" contact • Emergency uses	**User #4** • Better coverage • Stronger vibrator • Bigger bandwidth or better traffic management (high priority)
Wyndtell	**User #5** • Depends on areas that the message can't go through • It is not good for hearing people I wanted to call via pager	**User #5** • It is very useful just like cellular phone that hearing people use • I like Wyndtell very much!!	**User #5** • Because hearing people don't understand Wyndtell or don't have the time to wait on the line when the response is received
Wyndtell	**User #6** • No coverage in some areas and rural • Sheltered buildings that blocks receiving the message	**User #6** • Independent	**User #6** • 100% coverage in the entire USA
Wyndtell		**User #7** N/A	

Wyndtell	**User #7** • No coverage in rural areas • Delays of delivery messages • Lousy services		**User #7** • More COVERAGE!
Chatroom	**User #1** N/A	**User #1** N/A	**User #1** N/A
Chatroom	**User #2** • Oftentimes strangers are in chatroom if it is a private chat, it is better • Difficult with emotion/tone	**User #2** • Able to communicate with individuals from diverse backgrounds • Can communicate with hearing people • Can print information	**User #2** • Emotional tone obstacles can be fixed by adding emoticons, Internet, idioms and asking for clarification
Chatroom	**User #3** • Limited address book	**User #3** • Easy to chat	**User #3** N/A
Chatroom	**User #4** • Monitors- no "free speech"	**User #4** • Can meet and join with any people/conversations	**User #4** N/A
Chatroom	**User #5** N/A	**User #5** • I enjoy chatroom and it is faster than IM; no one interrupts me in chatroom	**User #5** N/A
Chatroom	**User #6** • Rarely use it	**User #6** N/A	**User #6** N/A
Chatroom	**User #7** • N/A	**User #7** N/A	**User #7** N/A
AIM	**User #1** • No real time chat option • No override layout	**User #1** • Short program • Not memory hogging like	**User #1** • Add real time option • Add override layout option

		ICQ	
AIM	**User #2** • When new AIM is sent to me—I have to be very conscious of it—keep checking or I will miss it due to tone beep that I cannot hear	**User #2** • Easy to use and communicate privately with one individual	**User #2** On top of windows screen have an area for AIM and make it state the screen name and flash when a person responds or sends a new AIM to me
AIM	**User #3** • "Stealing windows"**	**User #3** • FUN AND EASY • Buddylist • Easy instructions to follow • Minimize windows	**User #3** N/A
AIM	**User #4** • "Stealing windows" • Others can see me—don't really know how to block users and be sure that they can't see me online • Got others' password by accident by "stealing" their window	**User #4** • Beats long-distance phone calls • Better than TTYs • No monitors	**User #4** • Videoconference
AIM	**User #5** N/A	**User #5** N/A	**User #5** N/A
AIM	**User #6** • Connection • Minimized windows that flashes continuously	**User #6** • Great tool on PC • Cheaper than long distance calls • "Stealing windows"*	**User #6** • Add a control feature: interruption mode or flashy new message
AIM	**User #7** • N/A	**User #7** N/A	**User #7** N/A

ICQ			
	User #1 ▪ Too big application ▪ Memory hogging ▪ Poor and unstable connection for real time chat	**User #1** N/A	**User #1** N/A
	User #2 N/A	**User #2** N/A	**User #2** N/A
	User #3 ▪ Very complicated to follow steps	**User #3** N/A	**User #3** N/A
	User #4 ▪ Too many features	**User #4** ▪ Loaded with useful features ▪ No monitors	**User #4** ▪ Videoconference
	User #5 N/A	**User #5** N/A	**User #5** ▪ I don't know what ICQ is ☺
	User #6 N/A	**User #6** N/A	**User #6** N/A
	User #7 N/A	**User #7** N/A	**User #7** N/A

1. How do the Internet conferencing tools have **impact** on their Deaf messaging clients? Please list your views on each one of these chat tools below:

1) **Wyndtell**

User #1:

- I can send/notify my wife—communication is necessary!

User #2:

- N/A

User #3:

- Very convenient
- Very accessible to my other e-mails
- When I get lost, I get directions on the spot from friends via Wyndtell
- Makes my business trips much easier when contacting people
- Great at CONVENTIONS! (because almost everyone has Wyndtell pagers)

User #4
- Flexibility
- "Anywhere"
- Whoever has Wyndtell pagers will get their messages before they get through their regular e-mail accounts.

User #5

- Faster service
- In the past, Deaf people had to go home to check the messages on their answering machine. Wyndtell is a blessing for Deaf people!

User #6

- It gives me the freedom
- It is a wireless device

User #7

- It keeps me in the loop with my family

2) **Chatroom**

User #1:

- No impact on me but it is a very useful tool for meetings

User #2:

- The chatrooms allow me to talk with a lot of people who share similar ideas.
- I am allowed to communicate openly without barriers.
- Sometimes I ask people in chatrooms what was said when there is a live video feed without captioning.
- I also like the anonymity of chatrooms.

User #3:

- No long distance charges!!!
- Live chats are free!

User #4
- Group chats
- Later lessened by AIM's ability to have group chats in private with no interruptions by strangers

User #5

- Save money on phone bills

User #6

- N/A

User #7

- N/A

3) AIM

User #1:

- Immediate messages

User #2:

- This changes me the most. I no longer use TTY with Deaf friends or use long distance calls
- This is ideal to use better than TTYs because of the ability to communicate with a person at the same time
- Can use emoticons

User #3:

- FREE!
- No LONG DISTANCE CHARGES
- LIVE CHATS

User #4
- Better than TTY

User #5

- Save money on phone bills

User #6

- A library of smiley faces
- No long distance bills
- Able to change color/font

User #7

- Easy to catch someone better than TTY

- Love to send smiley faces

4) ICQ:

User #1:

- Real time chat

User #2:

- N/A

User #3:

- N/A

User #4
- N/A

  User #5
- I don't know about this

User #6

- N/A

User #7

N/A

Appendix F

<u>Second Roundtable Questions</u>

17 November 2000

Second Roundtable Discussion

<u>**Review**</u>
Hypothesis Questions
Arguments
Findings of the First Roundtable Discussion
Conclusion

<u>**Purpose**</u>
Explain the purpose of the second roundtable discussion.

<u>**Remind them that no answers/opinions are right or wrong.**</u>

<u>**How does this Roundtable work?**</u>
A distribution of Roundtable sheets will be given to you individually.
Feel free to ask me questions for clarifications.
You can work on the Roundtable questions individually or in a group.

<u>**Introduction to Prototype**</u>
Show prototype using Director software on my PC to the participants. This prototype is designed for American culture—not cross-cultural language.

Prototype Discussion

1. From our first roundtable discussion, we came with some ideas. Are you satisfied with the ideas that are being implemented into this prototype?

a. If not, how can it be improved?

2. What about the layouts?

3. Is the design friendly? Easy to use?

4. What emotions/words do you wish to see if any different from the prototype list?

5. What about the colors? Background color?

6. Feedback/suggestion if none is mentioned from the above.

Thanks.

Name:_____
                (optional)

Appendix G

<u>The Second Prototype Data Raw</u>

1. From our first roundtable discussion, we came with some ideas. Are you satisfied with the ideas that are being implemented into this prototype?

Participant #1: Yes!!

Participant #2: Definitely.

Participant #3: Yes

Participant #4: Yes

Participant #5: Exceed my expectations

Participant #6: This is marketable

Participant #7: Yes

a. If not, how can it be improved?

Some were concerned about universal acceptable gesture.

2. What about the layouts?

All satisfied.

3. Is the design friendly? Easy to use?

Participant #1: Easy to follow.

Participant #2: Yes

Participant #3: Friendly user

Participant #4: Add text on the side in case some people don't know there is a box of animated images

Participant #5: Satisfied

Participant #6: Yes

Participant #7: Do not do anything. Just leave it as it is.

4. What emotions/words do you wish to see if any different from the prototype list?

Participant #1: A lot. What happened to "PAH"? Thought it was included.

Participant #2: 8 is enough.

Participant #3: Add facial expression such as eyebrows, cheek movements, etc

Participant #4: I am satisfied with this prototype.

Participant #5: Just leave it alone. If add more, causes more confusion.

Participant #6: I like it.

Participant #7: The list is good enough.

5. What about the colors? Background color?

All agreed that the color of the background for inside AIM box is a good color: white.

Appendix H

(CD here)

Biographical Sketch

Lee Kowalsky was born August 6, 1971 and raised in Michigan. She attended the Model Secondary School for the Deaf in Washington, D.C. and graduated with a High School diploma in 1989. Kowalsky went to Rochester Institute of Technology and obtained her Bachelor's degree in Professional & Technical Communication. After her graduation, she moved to Arizona to work for one year at Arizona Relay Service. Kowalsky returned to RIT to major in Information Technology for her Master's and she graduated last May. Kowalsky is currently a software Engineer at IBM in Research Triangle Park, North Carolina.

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