

## Computer Access for Students With Special Needs

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### Abstract:

The personal computer with adaptive technology is one of the most empowering and liberating tools in the lives of persons with physical disabilities. It opens education and the entire information world to a new population, and it does so in a mainstream environment. A pc and speech synthesizer provides equal access for the visually impaired. A pc with alternate input systems--single switch devices or voice recognition--opens access for persons with motor disabilities. A class discussion using CMC provides access for the hearing impaired without necessitating the use of a human interpreter. Not only will teachers want to include these students, but providing such access to computers and networks is required by law.

This chapter will outline the problem and opportunity. It will provide vignettes of persons who have made significant use of adaptive computing in school. The chapter will give an in-depth report on a pilot project providing two courses using the internet with students from Gallaudet University and from the Rochester Institute of Technology in a CMC classroom. This project demonstrates the unique ability of CMC to mainstream disabled learners in the educational system. Two thirds of the participants were hearing impaired, and one was blind.

### Introduction:

Computer telecommunications when enhanced by special, adaptive hardware and software, can drastically reduce barriers for persons with various physical and learning disabilities, and it can also facilitate interaction among those who are, for whatever reasons, inhibited in face-to-face settings. Both of these equalizing factors of computer mediated communications were noticed by students in a course Taught by Professor Norman Coombs at the /t Rochester Institute of Technology. One student in an African American history class which met both in the classroom and through a computer conference system recognized this phenomenon and commented on it, "I also agree with everyone else about what a good idea using this conference is. By using the computer as somewhat of a 'universal medium', the everyday communication barriers are avoided." He explained, "Whether this \*^ barrier is being hearing impaired, being Black, White, or Green, being shy or not a good speaker, or what have you, these communication gaps and many others are bridged." This meant enough to him that he add, "I wish all of my classed had a conference similar to this one in which some classroom discussion could be

carried on outside of class." This RIT course consisted of students of several ethnic backgrounds and also included both hearing students and hearing impaired students. The teacher, Coombs, was blind.

Hearing impaired students in a classroom require either that the teacher be proficient with American Sign Language or that an interpreter be present to facilitate the deaf student's class participation. When class discussion occurs in a computer conference, the hearing impaired person does not require any special assistance to become part of a mainstream educational setting. One deaf woman in an American history course at RIT sent email to the professor, "I really enjoyed having class this way because it allowed me to participate in a hearing class." She explained further that, "By that I mean I was able to get your /// \*^ opinions--first hand so to speak--and the opinions of the other students....I have felt so left out of it in other classes." Hearing impaired students may still have a problem with this format because, for those who have been deaf since birth, English is their second language. This woman lost her hearing as a young adult, and the computer conference was well suited to her situation.

Persons with other physical disabilities may require special software and hardware adaptations before the computer becomes a new communication medium for them. Visually impaired students may need either a screen enlarging program to permit their "seeing" the screen or a speech synthesizer which will speak what is on the screen. Motor impaired students often have problems in using the keyboard. Depending on the particular disability, there are various software and hardware devices which provide alternative input systems. Once appropriate access has been provided to the computer, these students function as equals in the computer classroom, and their disability vanishes. Everyone interacts on the basis of their ideas rather than having the communication shaped by stereotypes based on people's appearances.

Similarly, students who are inhibited in group discussion find that their stage fright is greatly diminished. One shy student confessed that with the CMC classroom "...you can say whatever you think or feel and not have to worry about somebody giving you a crazy look or something like that. I'm not a great speaker, so the notes conference helps me put my thoughts together and allows me to express them better without having my tongue twisted."

RIT/Gallaudet pilot project via the internet:

The unique ability of CMC to reduce many communication barriers inspired a pilot project in 1991 between Gallaudet University and the Rochester Institute of Technology. Gallaudet is a liberal arts university for the hearing impaired in Washington DC, and RIT has as one of its colleges the National Technical Institute for the Deaf. The pilot was to use CMC to include students from both campuses in the same class and to include in that class both hearing and hearing impaired learners. There were two teachers, one on each campus, and one of them was visually impaired. The pilot included two courses: Mass Media and Deaf Culture taught by Professor J. S. Schuchman from Gallaudet and Black Civil Rights in the Twentieth Century taught by Professor Norman Coombs from RIT

with Professor Joseph Kinner from Gallaudet serving as liaison and contact person at the Gallaudet campus. The remainder of this chapter will focus on the latter course and generalizations about the uses of CMC with the physically disabled learner.

The course content was delivered through a captioned version of the video series, "Eyes on the Prize" produced by Blackside and originally broadcast on the Public Broadcasting System. The text was *\_Voices of Freedom\_* by Henry Hampton. The class discussion was held on a computer conference system, VAX Notes produced by the Digital Equipment Corporation and running on a VAX computer at RIT. RIT students connected either by a DEC terminal in a campus lab or with a pc and modem from home. The Gallaudet students connected to a VAX at Gallaudet and reached RIT over the Internet. Personal contacts between students and between student and teacher use VAX mail. Only rarely did a student appear in person at the office of either professor. Coombs had previously taught several classes online including some hearing impaired students. He also has taught many deaf students in the classroom at RIT with an interpreter handling the communication with the deaf students. These students were mainstreamed in regular RIT classes. For Kinner, this was his first experience with CMC which gave him a fresh perspective, and in teaching deaf students at Gallaudet, he did his own signing in classes that are normally all-deaf students. The pilot class had eighteen students who finished the course. Three quit during the course. Two found they had taken more than they could handle, and one developed carpal tunnel syndrome which prevented his using the keyboard. Eleven students were on the RIT campus of which five were hearing impaired. Seven logged in from Gallaudet with one of them being a hearing student. RIT held a one-hour face-to-face orientation meeting to familiarize students with the computer system. About half of the students came. RIT students are frequently at home with computers because of their technical background and many did not feel the need of such orientation.

With few exceptions, Gallaudet students who signed up for the course did feel the need for a face-to-face orientation and all of them showed up for the first meeting. Having earlier introduced himself and his role in the course as the on-site liaison support person to the students in a letter delivered through campus mail, Kinner used the orientation to guide students through the use of the computer, to hand out materials explaining the course, and to emphasize the unique features of CMC. He then went on to demonstrate how to log onto the VAX and then supervised the students as they practiced doing it themselves. During the hour or so of orientation all of the Gallaudet students except one successfully logged on to the VAX; the student who was having difficulty met with Kinner the following day and did successfully learn how to use the computer. One of the important features of this course, even though students rarely availed themselves of the opportunity, was having the chance to meet face-to-face with Kinner when they needed advice, encouragement, or help. This was particularly true during the early stages when students were adjusting to the new technology and developing computer skills. Once these skills were mastered and the course was underway, however, students learned to depend more upon themselves and to seek their own answers to the problems they encountered. This emphasis on developing self discipline and individualized learning were what helped bring Gallaudet into this pilot project in the first place.

After viewing a video which portrayed the killing of a young boy, and reading related materials from the text, the students were asked to comment on the following questions posted on VAX Notes by the professor: Between 1890 and 1910, there were over 4,000 Blacks lynched, which is over 200 a year or something like 2 every 3 days! Although the number had dropped significantly by the 1950s, Till's lynching was not the only one which occurred. Why did Till's death make such national news? What aspects of Till's murder and of the trial were most surprising to you? The 1950s seem like a long time ago to you> It wasn't so long ago! I received my BS in 1955! Did any of you have relatives, still alive, who lived anywhere in the South at that time? Have they told you any shocking stories from their youth? These questions are only to start a discussion. Comment on anything related to Till and lynchings.

The first reply was from a hearing impaired RIT student who answered some of the questions and added some interesting family information:

**\*\* caps why? EMMETT TILL'S DEATH MADE THE NATIONAL NEWS SINCE IT WAS SUCH A BRUTAL MURDER AND MANY BLACK PEOPLE ACROSS THE UNITED STATES FELT THAT IT WAS THE LAST STRAW TO THOSE NONSENSE KILLINGS OF BLACKS IN THE South....TWO MEN WERE ARRESTED AND BROUGHT BEFORE THE COURT FOR KILLING EMMETT TILL. THERE WAS ENOUGH EVIDENCE TO FIND THOSE TWO WHITE MEN GUILTY FOR MURDERING EMMETT BUT A WHITE JURY FOUND THEM NOT GUILTY. TILL'S GRANDFATHER WAS A WITNESS AND HE HAD THE COURAGE TO POINT HIS FINGER TO THE WHITE MEN IN COURT FOR BRINGING GRIEF TO HIS FAMILY....MY GRANDMOTHER LIVES IN QUEENS, NEW YORK, AND I REMEMBER HER TELLING ME ABOUT HER VISIT TO THE SOUTH IN THE 1950'S. SHE REMEMBERS A LOT OF TENSION GOING ON IN THE SOUTH AND THERE WERE A LOT OF PROTESTS FOR EQUAL RIGHTS FOR BLACK PEOPLE.**

The next reply was a question from a hearing student at RIT: "I was a bit unclear after watching the video if the individuals that had murdered the boy had come right out and admitted that they had done it or just implied it....My next question is can that individual not be tried again even if he has the nerve to come right out and admit he murdered the boy?" At this point the professor pointed out that American law does not permit one being tried twice for the same crime. Next a hearing impaired student logging in over the internet from Gallaudet added: "I totally agree about the jury being so bigoted and I was surprised that the two men were found not guilty even though the evidence was there. AND not only that, they totally disfigured Emmett, I will never forget his face." He went on to connect the video to contemporary events from the news, "And for some reason, it made me think of the Rodney King beating in California. This clearly shows that racism is still around today. It's real sad." Next, another Gallaudet student said, "TILL'S DEATH MAKE SUCH NATIONAL NEWS BECAUSE, THIS VICTIM OF FOURTEEN YEAR OLD WAS MUTILATED AND IT NEVER HAPPEN TO BE SO GRUELING AND ALSO TO A MERE CHILD. WHAT I FOUND MYSELF ANGRY NOT SURPRISING ABOUT THE TRIAL IS THAT THE DEFENDANT WAS FOUND NOT GUILTY, WITH ALL THOSE OBVIOUS EVIDENCES AGAINST THE DEFENDANTS. IT IS

OBVIOUS THAT THE JURY (ALL OF THEM ARE WHITE) FOUND THE DEFENDANTS NOT GUILTY BECAUSE THEY ARE WHITE. THE DEFENDANTS KNEW THAT THEY COULD GET AWAY WITH IT BECAUSE THEY WONT BE TRIED FOR MURDERS DUE TO DOUBLE JEOPARDY." In spite of the apparent language problem in the previous reply, the student was not inhibited from participating, and no one had a problem understanding the intent of the remark.

After two more well written replies from Gallaudet participants, another RIT hearing impaired student commented on how she was emotionally moved by the pictures in the video. Then she went on to add some stories from her family:

I spoke to my father last night on the phone and asked him questions about that trial. He grew up in a county in Louisiana where there were lot of people that are racist. I asked what people there thought of it. (He was a year older than Emmett when that happened.) He said he heard a lot of talk about the men what they 'd do if a black man had flirted with their wives. They said they'd shoot him. Despite the fact Emmett was only 14, some thought he was grown up! I'd like to share my father's experience relating to this case. In his neighborhood, a young black man had flirted with a wife of a man who was away in Marines in Korea. That man's brother-in-law found out and wanted my father's brothers to help him take the black man to the woods to beat him up. But Dad's brothers refused to help. Dad doesn't remember what the white man did to him, but doubts he did anything cuz he was afraid to do it alone."

The teacher again stepped into the discussion flow to reinforce the personal sharing that was taking place, "Thanks, for sharing those stories. It helps us realize that history isn't always so far away and doesn't always relate to other people. It sometimes is closer to home than is comfortable." Believing that connecting past history to personal and family happenings makes the history more real and facilitates learning and understanding, the teacher wanted to encourage this kind of sharing.

This is only a sampling of the 23 replies to this topic, but it demonstrates the ability of CMC over a data network to carry on a discussion by people separated by physical distance, physical disabilities and also by time. The course lasted ten weeks. Students viewed fourteen hours of documentary television, read the textbook and shared in the computer discussion. Students were asked to respond to 58 sets of questions, and the eighteen students made an average of 21 replies. During the course, students averaged 227 lines of discussion each. (Actually, as there were a couple students whose participation was minimal, the average for those who genuinely participated was even higher.) Students also had to write two take home essay exams and to submit one written paper. These assignments were also submitted on the computer. This much writing was important for the development of those students with English deficiencies. While this was not one of the course objectives, it was an expected biproduct, and more than one student said that it did help their writing abilities.

The final discussion topic in the computer conference asked the class to express their views on the electronic classroom.

\*BERGE: THE QUOTES BELOW ARE VERY INTERESTING. WITH RELUCTANCE, I MAKE THIS SUGGESTION BECAUSE OF THE LENGTH OF THIS PAPER: THIS SECTION BELOW, PARTICULARLY, AND A COUPLE OF OTHERS NEEDS TO DROP THE QUOTES (OR ONLY KEEP ONE OR TWO) AND THEN SUMMARIZE THE CONTENT.

The student opinions expressed within the computer conference were not anonymous and were written before the course grade had been determined. This may or may not have influenced their frankness. "At first it was weird for me", one young man from Gallaudet confessed, "because I am so used to being in a classroom instead of using the VAX as a way to receive and send messages from me and the teacher and to students too. But as the weeks went by I got the hang of it and wasn't afraid to stay with the course. I find it enjoyable and it is a unique experience I will never forget." Another Gallaudet student said that she enjoyed the class because, though she was African American, she had never learned much about the civil rights movement, and she appreciated the opportunity. "Anyway, Dr. Coombs," she continued, "I think you did a marvelous job considering the fact that you haven't met any of us here (at gally) and I wish you success in the future...." A woman from RIT also shared her original anxiety, "At first I was a little leery about doing an entire class over the VAX, but it turned out to be not as hard as I anticipated. I enjoyed the material--it was interesting and it wasn't a class that puts you to sleep." Another RIT student added, "I enjoyed the way the class was done very much. It enabled you to work on your own and still obtain discussion with the other classmates." He said he also appreciated this system because "...it put the responsibility on the students to learn themselves."

Another Gallaudet student said she enjoyed the class because it was not in a classroom. "Watching the videos made me feel like I was really there watching it happen. I saw so much anger and other emotions in blacks and whites, it helped me see how they really felt." Although she did not specifically comment on the computer aspect, she concluded, "If I was asked if this course should be continued for future quarters, I'd say yes. It is worth an experience." Another Gallaudet student commented that the course helped her develop more self responsibility and also inspired her to take an internship at the King center in Atlanta. A hearing Gallaudet student said, "in all, I enjoyed this new experience of an electronic classroom." She confessed, "I found I participated much more in this situation than in the typical classroom." She stated that she enjoyed the class more for its content than for the electronic delivery system. She did, however, appreciate the fact that the videos and computer conference gave her much more scheduling flexibility than the usual class format. A hearing impaired Gallaudet woman shared how much she appreciated this flex learning system: "I really enjoyed this experiment. It differs greatly from my everyday experience with going to class. This way of going to class has taught me how to be responsible for my own work. I also liked it because it allowed me to enter class whenever I want to and that helped a lot. I believe that more methods like this should be offered in the near future because it is an excellent idea for students."

Some students who did not participate much also shared their successes and frustrations. One Gallaudet student who had difficulty with English admitted that she was anxious

about taking a course on the computer, but she specifically thanked Professor Kinner for encouraging her to take it. She said the computer wasn't that hard, but she also hoped to meet the RIT professor in person some day. She seemed to miss the face-to-face interaction, but she also seemed to lack self motivation. A RIT student said that "Even though I do not get to participate much, I still find it enjoyable reading other students' feedback. I think I would be a better participant in a classroom than on the VAX because I never seem to be able to get to the computer and type....." Another RIT student liked being able to compare ideas with his deaf peers from Gallaudet, but he found his outside activities interfered with his getting to the computer. When he did enter the electronic classroom, he was overwhelmed to "find that I have over 100 notes to read....But I find it a valuable learning experience since I have to be motivated enough to learn it myself and make myself face it." The final comment from a Gallaudet student said that the course taught her more about computing and she added, "It taught me some responsibility. Every time I finish my classes and can find time to do VAX. I really enjoyed it...." The / other complaint listed by several of the Gallaudet students was that, when they were connected to the RIT VAX system over the internet, sometimes the screen would "freeze" for seconds or minutes between keystrokes. This was due to heavy line traffic and was one of the complaints that spurred an upgrade of the connection with the internet system.

#### Research Evaluation Report:

The course was also evaluated through questionnaires and interviews. These were conducted after the exam and grading in order to protect student anonymity and encourage an honest response. While the picture that emerged was quite similar to that provided by student comments in the computer conference, some negative comments were stated a bit more strongly. Though the responses were anonymous, they were also voluntary and only about one quarter of the students participated. This might have skewed the results in a more negative direction.

The formative evaluation was done by Barbara G. McKee and Marcia J. Scherer from Instructional Development at the National Technical Institute of the Deaf at RIT. Students were requested both to fill out a questionnaire and to participate in a personal interview. The interviews were conducted by a graduate student who was in an educational specialist program at NTID and who was also proficient in American Sign Language. The study combined the input from students in the two courses into one set of results. Separate data is not available for this course as the intent was to evaluate the delivery systems rather than the courses themselves. A total of fifty-one students from the two campuses registered for the classes. Twenty-six were from RIT and twenty-five from Gallaudet. Six dropped out, (two from RIT and four from Gallaudet), and the report was not able to determine the reasons for their decision. Of the forty-five participants--twenty-four from RIT and twenty-one from Gallaudet--who finished the course, eight voluntarily filled out questionnaires and ten came to a personal interview meeting. Once the courses were concluded the members moved on to busy schedules and were difficult to reach. It is also possible that those who were hearing impaired, which was about three quarters of the group, may have been resistant to being objects of study. While the goal

may have been to study the system, filling out questionnaires and submitting to a personal interview may have felt as if the person was the object of the evaluation.

The questionnaire asked a series of questions about the students opinions of various aspects of the course and had them rate their answers on a five point scale. The interview also tried to probe the same issues but in more depth and with better opportunity to include subjective responses. The report also included evaluations by the interviewer and by the faculty who taught the courses.