

ANNE MEYER

ORAL HISTORY

COMPUTERWORLD HONORS PROGRAM
INTERNATIONAL ARCHIVES

Transcript of a Video History Interview with
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Center for Applied Science and Special Technology

Recipient of the 1993 21st Century Achievement Award in
Education & Academia

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Date: May 4, 1994

JE: It is May 4. We're talking to Anne Meyer from the Center for Applied Science and Special Technology. Otherwise known as CAST. We want to find out from her something about how she got started in this business and then how CAST came along and the relation between Gateway and CAST programs and so forth. Tell us a little bit about your background. How you got interested in computers.

AM: If you want a little background on pre-CAST, I've always been interested in design. I was involved in graphic design as an undergraduate.

JE: Where was that?

AM: At Radcliffe. I was a combined major in psychology and design. I did work on studying infant perception and designing books for infants as an undergraduate. So in some ways this goes back a long way even though its a circuitous route. I worked in graphic design for a little bit after I got out but didn't find it meaty enough.

JE: Was that in the Boston area?

AM: Yes. So I then went and was trained at a school for dyslexic children in teaching approaches, with the idea that if I understood how they learned and what their problems were, I could design teaching materials. Again trying to combine both interests. Fifteen years and several degrees later, I found myself working as a psychologist. As I worked more with learning disabled kids I got more interested in the psychological aspects.

JE: So you went back to school after the school for dyslexics?

AM: Yes I worked at the Landmark School for three years and basically felt that I needed to know more so that I could be more effective and went back to a Masters and Doctoral program at Harvard, the School of Education. And in the course of that also I was initially studying more from the neurological or functionally education end of things - what was going on with these kids. When I was at Landmark it became clear to me that psychological factors self-esteem, the ability to persist, other of kinds of strengths had a lot to do with whether they succeeded. I also was trained as a psychologist and became a licensed clinical psychologist with this background. After that I was working in a multi-disciplinary clinic in a children's hospital doing evaluations of kids who had learning difficulties. There were a bunch of us in this clinic and we began to both be frustrated with the effectiveness of what we were doing and to be curious about the potential power of technology for the kids we worked with. We felt that writing a report and trying to suggest maybe a different book or suggest that kids be in smaller classroom or things like that, that ultimately we didn't feel we were having the impact we would like to have. Several of us have used word processors just to write dissertations.

JE: About when was this?

AM: This was in the early 80's.

JE: Your Masters and Doctoral work were in the late 70's?

AM: My Masters was in 1974. I took a long time to take my Doctorate, which was in 83. My excuse is that I was doing these internships and whatever. I was working at the hospital as an intern. Several of us were just sort of curious and also felt ...I had worked with learning disabled kids and dyslexics was my specialty. Just at the simple level of thinking "Well word processor and spell checker really made my job of doing the dissertation a lot easier and quicker and shouldn't a kid who has trouble with handwriting and spelling have this same tool?" Which at that time was kind of a travesty because in most educator's minds. There are still educators that think that word processors is cheating. That somehow the computer writes it for you or something. A lot of the thoughts we were having were revolutionary even though they seem totally humdrum now.

JE: Where would you encounter some of these resistances? At meetings or people who learned of your work and comment spontaneously?

AM: Just in working with individual kids. I ended up as an expert witness in a trial in the state of New York, defending a dyslexic boy's right to use a lap top computer to take notes in class. The school for many reasons. (there were many reasons for resistance), one is "this isn't the way its done", two - print is the be all and end all and the god of education and people are very reluctant to consider that alternative media are viable, legitimate, appropriate. There are still people who think that word processing is not giving the kid the appropriate education.

JE: You were saying that people were resisting these ideas.

AM: There's resistance in the teacher community. There's resistance in all of the institutions that surround education: publishers. people who have specialized teaching methods with have to do with how you teach a dyslexic kid or how you provide therapy to a student with cerebral palsy or how you provide speech and language therapy. The resistance stems from the fact - that at its most cynical level - this is how these people make their living but I think that most people that are involved in education that perhaps that is not their main concern but that they have a discipline that they've been trained in, that they're used to delivering that they're experts in doing things a certain way and its very hard to look at something that may actually make their entire enterprise they're involved in obsolete. It's understandable that they might resist that. For publishers there are financial issues. Print is the delivery method and the source of business and the concept that you might want to deliver your curriculum electronically not only is a big expense and a big worry and is a threat to the way they do things now. In a way it's very understandable and we learned very early that you don't charge in there. You have to think about how you can bring about change in a way that's constructive and is really going to be effective.

JE: Have you found as people either criticize your ideas or just react to them, they do every bring up past efforts at using technology that perhaps have not come out as well as one would have hoped?

AM: Yes. I want to just preface it by saying that in fact that in many, many cases we have been quite successful and haven't met horrendous resistance but more by virtue of finesse and care than by virtue of sort of an open arms receptivity. Schools have been burned. They have either purchased or been given equipment that they haven't been provided training for or that wasn't really any different. It was just another gadget.

JE: I was thinking of something before your time. The tape recorder historically had a big surge in the fifties. It was something that people said would actually replace teachers. Some of the same feelings of anxiety and threat came up at that time. You said that one of the first things you thought about to extend the technology to disadvantaged students was by thinking about how handy the word processor was for you. What were the early things you tried to do with this technology? Are you thinking primarily of the computer?

AM: Primarily the computer. We started with a focus on learning disability and attention deficits and very quickly went to physical disabilities and sensory disabilities as well. Our focus has been the computer and devices that enable people to use a computer who can't use standard access tools. We also work with speech synthesizers and power mobility wheelchairs, things like that. The first things that we really did were I think we brought some kids in for a summer program and we got a few computers and a little bit of software.

We've always had a focus on tools. Not so much computers to teach skills. It never seemed very logical to use a computer to teach a kid skills so that the kid could use print which is the way a lot of the beginning uses of educational technology were drill and practice for something so you could use a book. While that has a place most certainly, it was no means the most powerful in our mind.

JE: When was that?

AM: In the summer of 1984. The very first thing we wanted to do was to have kids come in and create something that they could take home and that they could be successful at. It might just be to draw a picture and to print it out. It might be to write a little story or to take a story that existed and simply change a few of the words and make it their own. We were very early committed to having the person come in and make a success.

JE: This was still in the Boson area?

AM: In Salem, North Shore Children's Hospital. At that time we were a fledgling clinic at the hospital. We raised our own money We got an early grant which we used to support the summer program, buy a few computers and pay a very small portion of one of us to raise more money. We had the vision to know that getting more money was going to be important. The other thing we did which was really fun, there were five of us a little mini MaArthur genius grant to say "Here's a thousand dollars go learn something that will contribute to this enterprise."

JE: Did you in this process get in contact with the pioneers in learning application of computers in the Boston area?

AM: In the very beginning we were sort of bumbling around on our own. We did bring in people in the field to come. We arranged a couple of seminars where we invited faculty teachers in the area to give a talk in what's come and give a talk in what's happening in math curricula or what kind of teacher utilities there are. We would go to conferences a lot to hear people talk. This was kind of on the side of a full-time job and we were kind of experimenting in trying to see, by working with kids what really did seem to work and what didn't.

JE: Did this group include the chief of the unit?

AM: I'm now the co-executive director and the other co-executive director is David Rose and he at that time was the Chief of the Diagnostics Service. This fledgling clinic was also under his aegis. We raised all our own money and started with a small amount of time and kept building.

JE: You didn't have to fight your administration?

AM: No but we did have to fight one level up which eventually did become the splitting point for us. What happened was there was a coincidence of us starting to do this and the hospital's starting to have financial trouble as many hospitals did. They started a management company above themselves that was for profit and the goal was to have it engage in various for-profit activities and feed the money back to the hospital. What actually happened was that it was hard to get the for-profit started that they started to take more and more overhead out of the hospital. They started taking more and more of our overhead which, we had raised for the purpose of CAST and there was sort of a parting of the ways in terms of those kinds of issues and in terms of mission. We were really from the beginning R&D and in the R&D environment the service provision was part of our research. It was not something we wanted to grow to a major part, seeing many, many kids.

JE: So you were getting grants and found the hospital was cutting into that?

AM: Yes. They saw what we were doing as a potential service that they could grow that could bring in more money. They wanted us to see many, many people. They wanted us to see less disabled people, people who were maybe who could benefit from learning with a computer. We really felt that we weren't going to be able to continue. They told us that we were going to have to cut our budget by "x" amount. They suggested that we fire someone so instead of that we all cut back by a small amount in terms of what we were paid and we kept everybody on. That was more of our mentality. We're very collaborative. In 1986 we decided we needed to go off on our own. We incorporated as a not-for-profit and we got ourselves an attorney.

JE: Had you been calling yourselves CAST?

AM: Yes we had.

JE: When did that name start?

AM: Pretty much right from the beginning when we were first trying to raise our first money. It was in early 1984. We subsequently had second thoughts on the perfection of the name but by that time it was too late.

JE: You separated from the hospital.

AM: Yes we did. We rented space from the hospital for another 10 months or so. I believe it was 1987 when we actually moved to where we are now. We have a big lab where there's a lot of glass in our office, with the notion that the work is going on so that everybody can see, share what's happening. The office is very cheery. A lot of people who come there who are used to hospital basement environments are pleasantly surprised. It's kind of an upbeat environment that we have.

JE: You have continued then to work to raise money. But this allows you to take what patients you want and also move in the direction of whatever research you want to do. What has changed about your research from the time that you were in the hospital to now?

AM: I think that there have been a number of very significant changes. One is that we wouldn't belong in a hospital. We don't see disability in a clinical fashion at all any more. Our goals are to do with education, education reform and curriculum and the provision of tools to people so they can get done what they need to get done. Our focus is primarily is on children and education. We do work with adults but most of our big efforts are with kids.

JE: Are you moving a little bit away from disabled then and taking in more projects where you're doing more research with kids that don't have these strong disability challenges?

AM: Our research focus is still very much in the disability arena. What we're finding is that what we learned from studying relatively rare and relatively difficult kinds of problems...By looking at sort of trouble areas we're learning things about learning, about education, about curriculum that are applicable generally that we're making sure in the dissemination side and in the implementation that what we're learning is made available to the mainstream and that its applicable to the mainstream and that's what we're finding. The environment where we do our research is actually in the classroom. We say "this tool would be useful and this kid could go and be in a regular class with this tool but we go actually into the class and work with the teachers and the kids and gradually what we've seen is that there's been a shift in our perspective, a very significant shift in our perspective.

Initially we saw that the issues we were dealing with as somehow residing in the kids -- that this kid has a problem because he can't do x, y, z --he can't turn pages -- he can't read that word. Therefore we need to help this to be able to do that. We really see it completely different now. We see the problem as residing in the curriculum itself, in the accessibility of information and of tools for self-expression and that the tools and mechanisms of print that's all we used to have. Therefore if you couldn't hack it with print you really had to learn how to or be sent somewhere else. And now that we have multimedia and digital technologies, information can be presented in alternative ways and therefore the restrictions, the barriers residing in the curriculum and in the structure of the classroom rather than in the child.

We're working to make a change in how curriculum is published, how it's presented and how teachers are trained in order to be thinking about the variation in the classroom. There's a lot of variation. Some of it happens to be on the tail end of the curve and we happen to focus there to make sure that those kids can be included. It's the way we learn but the goal is that accessible interactive curriculum be available for everybody.

JE: You started out developing programs perhaps with this other point of view. Were those programs a bit more focused toward the standard print kind of approach or did you get away from that right away?

AM: Actually for the first four years, I would say, we actually weren't developing software. We were interacting with companies saying "Gee you know, if you put this feature in and that feature in it would make it better for the learning disabled kid or the kid with the physical disability". We did fashion switches and access devices from the beginning. But it wasn't until the advent of certain affordable multimedia digitizing tools, which was really in 1989. In our case since we work on the Macintosh it was hypercard which is this sort of multimedia building block environment and the scanner, the ability to take images and scan them into the computer and to digitize sound inexpensively and easily that was the beginning of our rethinking and was the beginning of Gateway Programs and it was the coincidence of those tools being there and us already working with these kids that began our shift really.

JE: So Gateway Programs are essentially multimedia curriculum programs that are produced by CAST?

AM: Yes. Initially the impetus was Matthew and another student Megan who was physically disabled and visually impaired. We realized because they were going to kindergarten we were able to do all the things to get them in the building which involved getting the school to build a ramp and all that kind of stuff. Once they're in the building, they're in the classroom what are they going to do? They can't do any of the things that you do in kindergarten. They can't browse a book the way preschoolers do. They can't turn a page and look at the pictures and be the one to decide when to turn the page. When these digitizing tools came out, the first thing we did with Matthew was to digitize one of his books. He had a book on transformers, intergalactic warfare, my favorite subject! I'm sitting up all night scanning in these pictures of robots and whatever. But that was his favorite book.

In order for him to read it, somebody had to hold him in their lap and get some indication from him when to turn the page and so on. And in school he couldn't work with anything. We put the material in the computer, we built in a software-based system that enabled him to turn the pages and to have the text read aloud when he wanted. He didn't have to have it read aloud. He could choose that when he wanted. It was so powerful and so immediate for him. This was the first time where he'd been able to do this. It was just such a powerful moment. He understood instantly how to use it. One page and he understood how to use it. And he sat and he read this book from beginning to end. He was rigid with excitement. Sweat was pouring off of him and he was just beside himself because he could actually do this. He made it very clear that he didn't want anybody near him he just wanted to do this thing, his book.

That was a big moment and realized that this was fine for one book but what about the other books? We made a template with all of the access routines built into it so that teachers with our help could scan stuff in.

JE: You made a frame kind of thing.

AM: We got permission to publish a few titles of classic books that existed and we worked with a publisher called Don Johnston Developmental Equipment and his specialty is the disability market. This was his first Macintosh product and he was a little skeptical. We put out a set of books and it was "Gateway Stories 1" and the template. That was our first go at this.

JE: With Gateway Stories 1, did you send out a standard group of scanned things plus the template or did you send out the books and the teachers would scan them?

AM: Actually there were two products. One was the stories, which was the book, the Arnold Lobel "Mouse Tales" in electronic format and in print. So when you buy this you get both, plus some stories that actually started as a hypercard based stories and we built the access routines in so that kids who were visually impaired, physically impaired or learning disabled or who couldn't read very well could get at these great stories. The template was another piece all together.

JE: When teachers understood what was possible they could move to the template.

AM: Right, they could move to the template.

JE: How long did it take you to do this?

AM: This product was actually started in 1988 and was published in 1989. I think they came out at about the same time. We subsequently did another volume with more books.

JE: You see these as a downstream product that sprang from your initial work with Matthew and Megan. You were focusing on specific problems of real kids you had worked with.

AM: Right and that we had a situation where a child had a certain need and there was an educational requirement. We were solving a very specific problem. We very quickly saw from just broadening from what were providing from just one child to another child, Matthew could see fine so little buttons on the screen are fine for him but Megan has visual problems and can't see them so we had to make the buttons talk. If you want the buttons to talk you can but you don't have to. These are settings that could be changed. If you don't want to have either one you don't have to.

JE: How does Megan get a button to be pushed?

AM: Megan has a giant red switch mounted on the arm of her wheelchair and she can use her elbow. Matthew uses his chin. Other people we have use their eyebrows. It depends. What became clear, not that this is a tool for kids like Matthew, but this is a way of publishing or putting out a book that can be customized for everyone.

Print is one size fits all. Print is you've got to use it the way it is. If you can't that's too bad. With electronic media you can vary almost every dimension of the information and of how to get at the information. That was an idea that we had developed as the tools became available as the problems presented themselves and it led to a completely different way of thinking.

JE: Those were your first products. You're continuing to develop more things. Can you tell us a little bit about those?

AM: We have many small software products and a few little switches and devices like that which we publish at low cost. We call it Researchware. It is the result of our research. It's made available to teachers and families and students at a low cost. More significantly what we realized when Gateway had been out for a while was that these titles were fine and the templates great. But how realistic is it for teachers all over the country or parents to scan it in? By time you get to the level of 7th or 8th grade and you have of text it gets essentially impractical and it's inefficient certainly to have all these different people doing the same thing. And we decided that we would go to mainstream publishers and make them understand that it was their opportunity and ultimately their obligation to publish curriculum in electronic form, thereby broadening the constituency of kids that could actually use it.

We tried three or four large publishers one of whom we go so far as to have a contract with and get 7 or 8 months down the road on a product which then did not work out for a variety of reasons before got to Scholastic and their vision, it being essentially a family company which is an interesting thing. We had worked with some of these mega companies, which are buried within companies, and being able to talk directly to the person who can make the decisions and who has the vision and has the educational mission made a big difference. They latched on to the idea of both an expanded concept of what literacy is, now that we have multimedia and a notion that if you publish an early literacy program both electronically and in print it becomes a mainstreaming tool that essentially the book is presented on the screen. If you like it the way it is and can use it the way it is, fine. If you need a different color print, a different size print, a different color background, if you needed to read, if you need it to scan because you need to use your elbow that's an option and you set that up. And you set that up, a teacher sets that up that you want scanning and I want my text yellow on a black background and I want this way to have the words read, then every time the child uses the book its presented the way he needs it.

JE: What if they want to read a real book?

AM: These are real books. You mean a physical book? The way this is published is both in print and on screen.

JE: So if there are any iconoclasts who whatever their background is, just what to use it as a book, they're not penalized?

AM: No. In fact I'm one of the great fans of print. I'm not going to curl up with my computer at night and read unless it were the only way I could do it in which case I would.

The other thing though is that this is an instructional tool. It's to help kids learn to read and it's very interactive. It can record their own voices reading. They can hear the master or the mentor reader read and they can read themselves and play their own voice back and work towards mastery.

JE: This is quite sophisticated stuff. There are quite a few programs that do these things individually but there aren't a lot of integrated set-up so you had to get someone to write all the stuff or integrate existing things.

AM: That's been an issue all along. When we did Gateway at the beginning the only way we could get copyright permission to do an electronic version was to assure the publishers that this was for the disability market and therefore small. That's not how we would do it now. It's not small. It's for everybody. In the case of Scholastic they actually commissioned more than half of the books both the text and the artwork were created for this. Others they already had the rights to or were able to obtain permission. But the whole copyright issue I think in ten years is going to be conceived of differently. Because there's no question that electronic formats are extremely powerful both for learning and for an intellectual community where people are creating articles by editing things back and forth and essentially evolving knowledge rather than creating it and then dispensing it. Somehow the people who do the work need to be compensated for what they do. It's not going to be in the number of physical copies sold. This is knotty problem.

JE: Getting back to the children who don't have the challenges. How have transitioned in your experiments from the original group you were targeting, which was the disabled into the not so disabled?

AM: I think really the location and focus of our work has enabled that to happen. Initially we had kids come to CAST and we had after school programs, which we still do some of in the summer. But we very quickly realized that its part of the concept that the problem is not inherent in the kids, we can "fix up the kids or give them tools", but they're going to have to function in these real environments and we early started working in classrooms and understanding the barriers that exist in people's attitudes or in people's training -- and what are the practical barriers of having these kids participate in real classrooms? There are many barriers.

We're working in the environment with the other kids and we're seeing a lot of collaboration happening. A lot of usage of these tools by all the kids happens and in the course of that we're able to see the power of these interactive tools for kids generally. When we first went to publishers and said "this is a great tool for disabled kids", they weren't interested because they're market driven and it's just a small market. By the time we got to Scholastic we were saying "this is a tool for every kid and you can include these other kids" which is a powerful message. One that had meaning for them.

JE: Many school systems have truly separated special education facilities for the disabled. Is this not the case in Salem?

AM: We're talking mainstream classrooms. One of our goals with our pioneer program and our equal access research, which are two of our research initiatives, is in fact to solve the problems of mainstreaming, of inclusion. Our angle, although we're very committed to inclusion we really feel that people should have the choice. Instead of our goal being that every single child should be in a mainstream classroom, which by and large we really do think but that's sort of not the main ax. The main ax is that no child should be excluded from the mainstream by virtue of inaccessible materials. They should have a choice and that choice should include whatever material that they need to be in the classroom.

That has to be a mainstream legislated and principled and publishing source to make it happen. It's not going to happen with little enclaves. That's why we've begun to try and reach policy people and legislators and trying to essentially build an awareness of what we feel to be the case. Just as it's recognized as a violation of civil rights to have only stairs as an access route to a building that ultimately we'd like it to be considered a violation of civil rights to have only print as a means of delivering curriculum. And it's exactly the same issue.

JE: Do you think people will see it that way?

AM: It's amazing to us how many people once they see the tools and understand the concept, how many people you'd expect to be threatened by that concept actually do see it that way. Not necessarily get on the soapbox and talk about it as a civil right but who understand the barrier is in the material. And even special education teachers they're not going to be out of jobs, they're going to have an opportunity to work as a co-teacher in a mainstream classroom, which is what we do in our model. They have a colleague and they can provide support and they get a team environment and the kids get to work to meet the same goals.

JE: Has anyone expressed an interest from the outside in independently studying the results of this application both for specifically disabled and the wider group?

AM: I guess I would have to say no to that.

JE: I would think that the education school...It would be a fascinating area to study and try to see how the thing works.

AM: We've been trying to systematize our own data collection.

JE: Have you had a chance to publish anything on this?

AM: We've done something on this. We've had chapters in books and articles in journals and so on. We're actually now teaching a course at the Harvard Graduate School of Education. David Rose is on the faculty there and has taught a neuropsychology course for years. This year is the first year that the course is talking about how different tools fit with different areas of disability.

One of our goals is for the next five years is to systematize and really formally study in a more orderly fashion the actual results. We have personal results. We're beginning to get the ear of people who can make a difference on the legislative end. And of course this Scholastic piece is going to make a big difference in terms of people's awareness.

JE: These things take time. Now Matthew has been with you how long?

AM: About seven years.

JE: Have you been able to continue to create materials that work for him?

AM: Yes, and that's been the basis of our Pioneer Program. He's one our eight pioneers. We follow these individuals. Most of them are kids but not all of them. We follow them indefinitely as long as we can keep raising the money to keep doing that.

JE: So he's now 15-ish?

AM: No he's now ten. He came to us when he was three. Initially for mobility training and tools and communication training and tools and then very quickly learning tools. He's been in a mainstream classroom since kindergarten. He's never been in a special class. He's never been pulled out for special services. The issues change of course, his skills change and the educational demands change. He had to have something to read with and something to write with and something to calculate with. We haven't been able to create a wonderful tool for him to draw with yet that's very difficult. He can run a scanner. He can use rubber stamps but drawing on screen its tough. It's very awkward. You can move the mouse and the pointer on the screen. It's very easy to get it to go vertically and horizontally but to get it to do diagonally is difficult. So there's problems like that we're working on and right now he's about to enter middle school and its been relatively easy in a manner of speaking when he's been in one room with teachers coming into the room but now he's going to have to go class to class. He has a portable. He has a laptop computer which mounts on his computer but there are many different devices. He has to use a speech synthesizer and he has to run his chair and he has to run a computer and he only has one muscle system that works so its going to be difficult next year.

JE: Do the kids help out?

AM: The kids are fantastic. It's truly been an eye-opener, for both the kids and the teachers. Initially everybody in the school was afraid of this strange kid who was going to be coming. By the end of the first grade the teachers were fighting to have him because of the community it creates and what they learn from him. It helps people learn what's really important and whether your muscles work or not really isn't important in the end. And that's what people come to see. Here's a kid who can make a contribution, who has a sense of humor, who can learn.

He got interested in JFK. He saw some television thing on JFK. Now with his speech synthesizer he is initiating conversation, which is relatively a new thing. So he'll ask stuff. When he's watching a football game he'll say "go team" and stuff like that with his speech synthesizer even when nobody else is in the room. He got his mother to get some more video tapes and things about JFK and then he ended up doing report and they went to the Kennedy Library and they got to use the computer stuff. He wants to get on-line and download stuff. We haven't been able to develop that interface yet. That's another big area of initiative for us, access to the information highway, making sure that disabled kids can get on. None of standard interfaces are accessible right now. So that's another big area to work on.

JE: The curriculum package that you're thinking of putting out through Scholastic...

AM: It's actually come out.

JE: Did you develop a lot of new stuff for that or did you repackage a lot of what you've been developing or was it a mixture of both?

AM: We came to them with a prototype and a concept and a design and certain features that we felt should really be in it both because of disability and because its powerful. Our concept of what literacy is and how you can become literate has really shifted based on the tools that exist now. We were encouraging them to come out with this both in print and in electronic format and to draw upon the power of these tools for beginning early learners. They bring to the table great design expertise in terms of graphics and something that will be appealing and commercially viable plus they have... It was not an easy process. You can't expect people to understand the power of something when they don't know how to use it; they're not familiar with it. Everybody who hasn't learned something is a little apprehensive about it. And that apprehension makes it very difficult to look at it because they're looking through that screen. It was a very long process but it was a very fruitful collaboration and at the moment they are extremely proud of it. We are too. We would have liked them to go further. We would have liked them to build in signing on the screen for kids who are deaf. That was a very expensive proposition and they weren't quite ready to do that yet. I can understand it from an economic point of view. They had no idea if this product was going to succeed anyway. To add a huge proportion onto the cost they weren't ready to do. Now maybe in version two they'll do it.

JE: No matter how generous you all can be in donating your time there are a lot of equipment costs. How has that worked out? Are you getting a break from manufacturers?

AM: For our research purposes we include the cost of equipment in our grant applications. And in the schools that we work in we provide the equipment because there are just too many barriers if they have to raise the money. Although now we're doing a major project in Boston. We're very involved in the Boston School's Inclusion Movement and the work we're doing is becoming part of the inclusion model in Boston and those schools are receiving money and also raising money. In the research end of it, its just part of the expense. In terms of the ultimate implementation, there are a couple of things. Number one as you know the price is continually falling the power is continually increasing. When books first came out, they were chained to the library shelves and there was one per however many. If you had one in a classroom you were lucky. It's very parallel; it's a new medium.

JE: They didn't have books in classrooms. As a matter of fact students in medieval classrooms weren't allowed to take notes.

AM: Right that was definitely a no-no.