>> DR. JAMES DeCARO: Good morning, and welcome.

The session today, adapting tablet PCs. It's a project funded by the Department of Education, United States government. And the presenters today are Lisa Elliot and Pam Francis.

I've handed out the evaluation forms, but I do know that some of you have chosen to do it online. That's fine. We appreciate that.

So I'm going to turn it over to Lisa and Pam, and we'll have about 40 minutes. We would like to leave 10 minutes for questions and answers and stuff, so I will turn it over to you. Thank you.

>> LISA ELLIOT: Thank you, Jim. And I want to thank our interpreters this morning, Tina Nelson and Carolyn Morrison, and I'm Lisa Elliot. My colleague Pam Francis is presenting with me, but we have other colleagues in the room, Mike Stinson who is our principal investigator, and Donna Easton, and Ann is not able to be with us today, but that's our team.

So what we're going to do this morning is tell you a little bit about some of the research that we've been doing, and some of the -- we're going to do a brief demonstration of our technology, and talk about some of the lessons that we've learned in our preliminary research using the tablet PC which is a new innovation with C-Print technology.

So we have a number of grants at the moment that are investigating the use of Tablet PC technology with C-Print, but this morning I'm just going to be talking about two of them. These are both funded by the U.S. Department of Education, and they are stepping stones to technology grants.

Primarily we're going to be talking about the results from our initial study with some middle school and high school students, although we do have work that's proceeding with high school students and also college students as well.

So what we've learned over the years using C-Print is that it works pretty well in Liberal Arts classes and Social Science classes, but we face challenges in the sciences because sciences are taught differently than Liberal Arts.

In particular, in science, technology, engineering, and math, which we call STEM classes, teachers like to use a lot of visual stimuli at the same time. PowerPoints, writing on the board, using a visualizer, maybe using a movie, and they're talking, and they're doing this all at the same time. And this poses particular challenges for Deaf and Hard-of-hearing students.

C-Print originally was designed to use standard laptop computers, and standard laptop computers while we know that we can only type on them, and that poses a challenge when you have information that is best written or drawn that really doesn't translate well into the keys on the keyboard.

And finally, the software that we've used for C-Print was really designed for those verbal explanations, but not very well integrating graphical pictures.

So we have two -- excuse me. So we've come up with a way to integrate graphical options into C-Print, and we've really focused on two different applications.

The first one is to provide realtime note-taking support, which is very different than C-Print. It's like the regular notes that you might take in a classroom. However, instead of waiting until the end of the day, the Deaf or Hard-of-hearing student actually gets to see the notes being created right then and there. And because of the Tablet technology that we're using, the students are also able to write on the tablet just like other students would be able to write their notes.

The second application is a modification of traditional C-Print which provides speech-to-text, and now we're incorporating graphic information as well.

So we're going to give you a very quick look, and then we'll come back to a more complicated demonstration.

>> Audience member: What is the definition of Tablet PC?

>> LISA ELLIOT: Sure. Actually, Pam, are you using Tablet PC right now? A Tablet PC looks very much like a regular PC, however, the screen is different because you can write on it. You use a special pen called a stylus to do that. And the strokes are recognized, the software can recognize those strokes and translate them into graphic. They are also sometimes ways to translate the handwriting into more formal text, although we're not using that today. Okay?

>> PAM FRANCIS: So just very, very, briefly, like in one minute or less, the traditional C-Print system would look similar to this. This is just, you know, a screen with a text streaming, and what we're doing is we're incorporating a way to do graphics at the same time. So we added a drawing booklet so that the text now can stream as well as the graphic. So we can have the typing, and I'm not really going to type anything useful there, and we also can draw. So I will just put "page 1" again, not very useful information, but the student can draw on the information along with the text.

>> LISA ELLIOT: One of the reason whys we did this is also because when note-takers take notes, they might very well be drawing, traditional note-takers might be drawing, but to try and put the information together at the end of the period or at the end of the day or the next time that you get to see the notes, students might forget what's going on, or they might have trouble integrating it.

So this technology allows to us combine both the verbal and the graphical explanation in the same place visually, and it allows the kids to have that information to correspond with one another.

So we're going to tell you a little bit about one of the first studies that we've done that we've just finished recently. We were using the Tablet PC with middle and high school students. There were 15 students. They were Deaf and Hard-of-hearing. They are all involved in mainstream or inclusionary classrooms with other hearing peers.

All of the students were involved in five-week trials. So they had class for five weeks, and we chose a five-week period because in the United States the public school system usually has a five -- or, excuse me, a 10-week grading period, so we gave it to them for half the period so that we could see that maybe there was a difference in their performance before or after with or without the Tablet.

So for the first half of the trials, these were using the Tablet as a realtime note-taking device. There is a chart that briefly shows some of the student characteristics. This information is also in your handout, and it will be included in the paper that you will find uploaded very soon on the website.

But you can see that we had students ranging from Grade 7 through 11 in these trials. They were in exclusively science and math programs, and their hearing loss ranged from mild to severe. So we had a huge range of students.

Also, I have listed the kinds of support services that the students had prior to the trials. So you can see what kinds of things we were getting in class.

The second set of trials were -- there were eight, and these were with the C-Print, the captioning program with the graphics. Again, wide range of students. Wide range of reading levels. Science and math classes.

Three of those students had had traditional C-Print before they tried this. So they had an idea comparing with graphics and without graphics.

All of the data that we collected for the study was qualitative, or most of the data was qualitative, so we did interviews with the students and with the teachers to find out what their experiences were like.

This student has given us an explanation of what her traditional note-taking experience is like, and then comparing it with her experiences with the tablet note-taking.

So this talks a little bit about how frustrated she is when she just has regular notes.

The second quote is from a student who was able to use the C-Print version, the speech-to-text version in the Tablet. One of the special features of the software is that we can also integrate other electronic media that the teacher might have.

For example, worksheets, or PowerPoint slides, or anything else. And so what was happening for this student is that she was getting the speech-to-text, the captioning, in class, and she was getting also the worksheets that her teacher had given to her captionist in advance. So they were coming up on the screen at the same time. And the captionist was able to actually follow along and write down the answers much as we do during a regular math class.

We collected a little bit of quantitative information. We asked the teachers to look at the students' performance in terms of their academic progress, their ability to learn new vocabulary, and their classroom participation with the Tablet experience, and compare it to the past when they didn't have the Tablet.

And as you can see from this chart that for the most part the students did at least as well and oftentimes better than without the Tablet support.

There was one student who was having additional problems, and so his academic progress wasn't great. But what we saw is that most of these students were actually improving, or at least holding their own, which is also a good thing.

When we measure academic progress in school, sometimes we kind of forget about all of the little subtleties that go into that. One thing we asked was the class participation, the quality it, how did it change, or did it change at all?

So we have a quote here about a student from a teacher who was talking about the way that the questions changed the student.

So it seems from this quote that the student was understanding the material differently because it was being presented at that time and she was able to absorb it. So the kinds of questions that she was asking were qualitatively different than they were when she didn't have the Tablet PC.

Now it's time for Pam to show as you little bit more about the technology.

>> PAM FRANCIS: Okay. So let's take a look at the software. I'm just going to bring these right up. Common features of both uses, whether it's traditional note-taking or note-taking -- or, excuse me, C-Print with Tablet features with graphics. They both use Tablet PCs, they're both using the C-Print Pro software, and they both have notes distributed after class. The notes incorporate the actual images into the document.

So let's talk about the realtime note-taking first. As Lisa mentioned, this is used in the classroom for students who don't necessarily need the stream of text, but would benefit from seeing the notes during class. So let's do a little demonstration of that.

Okay. So what I am going to do is I am going to just go ahead and expand that. Now, this representation is a little odd, number one, because this page size is intended for the graphics. So normally it would be tilted in a portrait setting, and the note-taker would actually turn the Tablet and write like they were taking notes. So imagine the page will and little bit

bigger. So what I am going to do is I am just going to go ahead and just erase this. And if I was in the classroom and let's say that I was doing a class about fish.

Or I was in a class and they were talking about fish, which is a little odd. But we'll go with it. I could go ahead and I could say "fish" and I could go ahead and put down some names. So you can that I can go ahead and write down the information. The student would see that in realtime on their machine.

So I want to go ahead and show you that. Now, if you'll notice up at the top, and I am going to try to use my laser pointer, up at the top and you actually can't see it, it says "server" and "client." This is the actual note-taker, and this is the actual student (indicating).

The note-taker can continue to write notes. Let's see. Can I think of another kind of fish? Goldfish, how about a Goldfish?

And I am going to minimize this and bring our client over here. And the client can see it and add their own notations. So let's say that the goldfish is an important fish for some reason. I can go ahead and highlight that information as the client, okay, and the note-taker can continue to work.

One of the things that we noticed in our trials is that the server or the note-taker and the student need to negotiate pen colors and highlighter colors and some other things, and they can do that ahead of time just so that they're not using the same pens so that after class when the notes are printed, the student can associate who wrote what. Okay?

So let's see. What else can the student do? Well, the student can take their own notes, okay, and I'm going to hop to that screen. The student can take their own notes independent of the note-taker. So if they wanted to have their own page with their own notes, they could do that as well.

And we're going to just change topics here and we're going to go to math. And so the student can go ahead and write down that information, and the note-taker can view that information as well, but they cannot write on it. does everybody see my little -- okay?

So the student has a level of independence that they can take their own notes if they choose. The note-taker can see what the student is working on, but they can't add to it. So let's hop back to our booklet. And to add a page, let's go ahead and go to our second topic, which might be canines. And we'll talk about golden retriever maybe. Now, this isn't necessarily math or science information, but you'll understand what I'm talking about.

Now, the student has the option to stay on the page they are working on. So, for example, Page 1, or they can jump to Page 2. They can go ahead and set that up automatically so that when the service provider, the note-taker, starts working on Page 2, it automatically jumps to Page 2, or they can set it so that when they are ready they can move to Page 2. So they really have a lot of options as far as how they are using the note-taking. It really is a nice option for the student to see this information during class, add the notes that they want to make sure that they have afterwards.

So I'll just show you very quickly. The students can go in, and the service provider can go in, and they can go in and pick their pen size. Let's say that I wanted to change the size and color of my highlighter. It's very reasonable, very easy for them to go in and pick different colors. They can use different-sized pens. It didn't like that, did it?

Okay. And you will see that updated. See my pen size is a little smaller. I can choose a larger pen. My highlighter color is a little different. So the student can go in and really make it their own. They can add colors, they can add drawings, they have a lot of options. As Lisa mentioned -- we might all have to look over my shoulder. Should we press the button maybe down there and see if that works?

It's almost like there's no light at all projected, Paula. Should we turn the projector on and off? It's almost like the projector is off. Yeah, I think that our bulb may have died. Wow!

The projector just died. So we have a couple of options. We can turn this around and people who are interested in looking at that time can gather around the little monitor? Do you want to do that? Some people have seen this, so if you want to, I would encourage you to come up around the front here and see a bigger display. And I apologize.

While everybody is gathering, I'll talk a little bit.

As Lisa mentioned, we can import worksheets so that PowerPoint slides, worksheets, anything that can be made into a picture file we can import and the student can work on it. We've had some really fun experience with the students working on worksheets that they love working with the Tablet, and they love adding their information, and being able to print that out afterwards.

So what I am going to do is I'm actually going to go back to our presentation for a minute. Maybe.

Okay. I just want to talk a little bit about things that we've seen change as far as the role of the note-taker. Note-takers traditionally use paper and pen. It's been a real shift for some of the note-takers who don't feel comfortable. It's a little green, but it's coming back. Okay. But I really liked the togetherness here.

(Laughter)

Okay. So let's talk about the impact on the note-taker. Most of the note-takers that we work with, actually all of the note-takers that we work with, were professional note-takers. They were adults in the middle and high school setting who were apprehensive with the technology because it was, first of all, a laptop, and for someone who has never used a laptop that's a little concerning.

And then it was a Tablet. So it was -- it's not like setting a pen on a paper, okay? How you normally -- how many people have something where they use a stylus? So even like a PDA, correct?

When you set that tip down, it's not like the tip of a pen. The tip is actually where the cursor is, so it was an adjustment for people. It is a writing adjustment.

Some of the note-takers that we worked with, you would jump ahead of where they were working. So if they were working on a worksheet they would fill in the answers, but with this they can't do that because they'll be giving the answer to the students. So they had to really work in a more synchronized way with the presentation. They couldn't jump ahead because the student was watching.

Clearly they need to write legibly. They couldn't go back and change things, or clean things up. They could but the student was still looking at that time during class, so they needed to make sure that writing was legible, and the student could read it during class.

The biggest impact other than the technology I think that we saw was the fact that note-takers and the students were communicating, or they were interacting with each other, where traditionally the note-taker sitting in the back of the classroom, they don't interact with the student.

This system has a writing and messaging system where the student can actually write a message to the note-taker. So they were interacting and communicating, and for some I think that might have been a little intimidating because they had to really develop a rapport with the student that they hadn't had. So that "anonymity" was gone.

And scheduling, they had to make time to start the computer to make sure that they saved the file to make any edits. So there were more schedule demands, okay? Because that's very different than, again, taking the

paperback, if it's NCR paper, taking it back and ripping the student's copy off, or going to the copier.

Let's talk about the speech-to-text option. Hopefully this one won't -- it keeps throwing a error at the bottom. So I'm not sure. Very quickly we'll look at the speech-to-text option.

Obviously you have your typing, or captioning pane. And what the service provider did most often when they had these two is they put them side by side because they have to negotiate when they're going to type and when they're going to write, okay?

And in middle and high school classes, that might be a little bit easier because if the teacher is writing on the board and not giving too much explanation but just writing, they're going to write down the information that the teacher has on the board.

But if the teacher talks and gives valuable information at the same time they're drawing on the board, there is a level of negotiation there. One of the things that we've built into the software is something called tag teaming. We've had that before. But now what that allows is that will allow one person to write and one person to type. So in a college classroom, you could have a person doing speech-to-text, and another person, a student perhaps, adding in the drawings.

So two people can contribute in addition to the students. Okay? Does that make sense to everybody?

Okay. The drawing capabilities are the same. They can go in and choose pens, so on and so forth. One of the things that's very different that I find enjoyable, I guess, is the fact that if there's more than one student connected and I will point it with my laser pointer because I can't do the -- if there is more than one student connected, the service provider has the option to select the tab for the student so that they can view what the student is adding to the content.

And so let me go back and show you what I mean by that. Okay. Page 1, on Page 1, this is what the service provider wrote.

If I click on or tab on the student's tab, you will see the student's notation. Where that becomes an issue, and it doesn't seem like a big deal, but if you have three students using the note-taking system, they can't all contribute -- they could all contribute to the same page, although I would imagine it would be really busy, but this allows the student to contribute to that page and have their own notes. Sorry about that.

So it's really a nice option. Some of the things that we haven't explored yet with the tag teaming option, the teacher could actually be connected and could be while they're putting the drawings down they could show up and another person could be typing, or the teacher could be writing and the note-taker could be taking notes, so there are so many ways that we could do this. When we add graphics it complicates things quite a bit in terms of saving the files and how you are working with the file, but we are working through that. We save these as HTML files, and then most often when they're distributed to the students they're distributed as PDFs because the HTML files when they're e-mailed, and how many people have received e-mails with red "Xs" on them?

They forgot the drawings. It's the same with this, so that the easiest way, and the most economic way as far as memory or file size is to do it as a PDF. So there are many, many things, and I am running out of time, so there are many, many things that we can really do.

Go ahead.

>> Audience member: Does this hook into an art board in any way? When you mentioned the teacher, is there a way that when the teacher has a smart board in the room and the teacher draws on the smart board?

>> Pam Francis: If you have a smart board, the teacher's laptop can be equipped with the software, and they can draw on the software. That's one of our future efforts is we would like to try to open that up a little bit more. Right now they can do it on the software. And just because the software works with a Tablet doesn't mean that they have to have a Tablet, okay?

So let's say for example you have a speech-to-text service provider who has a regular laptop, but you have a note-taker who has a Tablet, they can still work on the same software in the same session. So that's one way at this point that the teacher can contribute is right in the software, and we're, again, that's kind of one of our next steps. Because smart boards are awesome, and I would love for to us be able to provide more ways for them to be used.

Any other questions? How are we on time, Jim?

>> DR. JAMES DeCARO: We've got seven minutes.

>> Pam Francis: Okay. No questions yet? Yes?

Well, I have a little more to share. Mike has a question.

>> Audience member: I have a comment that I gave a presentation to a student recently, and at that presentation I chose a demonstration with a traditional C-Print, and then I showed a demonstration with the Tablet, and this was mainly for students who were not working with deaf or hard-of-hearing students, but they were familiar with the speech and language development area in a general way. I said, "Well, if you can use this for yourself, you know, what would you think?"

And so when I showed the Tablet -- no, I showed them the regular traditional C-Print first, and they were fairly positive. But then I said, okay, after I showed the demonstration with the Tablet PC, I said, "Well, which one would you prefer to have in" and probably you are not surprised, but everybody it was a unanimous vote in favor of the Tablet option. So I think that people really are responding to the potential of the combination of both being able to have text and drawing together has.

>> Audience member: You can talk about the cost involved?

>> Pam Francis: I can. I am going to put these slides up for people who might be interested in reviewing that. The cost of a Tablet is more than the traditional -- well, not a little bit more, but probably several hundred dollars more. That will come down. Does anybody remember when laptops, just a standard laptop was $3,000?

So the cost is coming down. The speed is increasing. So for the Tablets that we bought, we bought IBM Tablets, and they were less than $2,000 with a meg of RAM, and pretty quick processor. So you can get a pretty good machine for under $2,000.

We have -- the ones that we bought are actually touch screens. Those the most recent. The jury is still out a little bit on that we're not sure about that yet because when the note-taker takes notes and their hand's resting on the screen, it play is a little havoc. But the C-Print software right now this Tablet software is not being released. It's still in testing. So I can't speak to the cost of that. But I will tell that you traditional C-Print software, the academic price is $225 for two licenses and the server and the client, or the service provider and the student. Okay?

Just very quickly, any other questions?

>> DR. JAMES DeCARO: May I ask you a question? When the product is being used, there are usually two service providers, a captionist and --

>> Pam Francis: No. Traditionally when the product is used it's either a captionist who is doing the typing, and the handwriting or a note taker who doesn't use the typing system. They're just doing the handwritten note-taking.

We haven't started our trials yet in the college classrooms, but we have a sense that for classes that are very dense with content, that there will need to be a note-taker and a person who is doing the captioning. Okay?

We have a sense that that will be, but that's our next step, and we'll start that in the fall.

>> DR. JAMES DeCARO: The reason that I ask the question is because it would seem to me that in dense topics like science and mathematics and other engineering kind of disciplines, that it would be very difficult to be doing captioning and then try to make some diagrams.

>> Pam Francis: Correct. And what a motivator. If you think about this for a college student who is taking the class to work with the service provider, and take down the handwritten information if they could have the notes after class. What a motivator for a student who is in class.

So, yeah, it does add one more piece of equipment, and that's a consideration. But it is a motivator.

Impact as far as the person who does the speech-to-text, again, the negotiation. They have to negotiate what is being done at the time. Is it the typing, or is it the handwriting, or do you have one person doing each thing?

Becoming more technology -- technologically savvy, well, they're used to a laptop, but that little Tablet element sometimes causes a little bit of hesitation.

Encouraging the students to self-advocate and be more involved, and that means that the student has a stylus, at least in our studies, the student has a stylus, encourage them to add notations, to highlight, to interact with the system. Okay?

Facilitating more of a team approach. That's especially important here when there are worksheets and things. If they can be made available to the service provider ahead of time, if the teacher has computer file or they have just the paper copy, it can be scanned and a JPEG file could be made, so really working as a team to get the materials so that the students can have them during class.

And adapting the editing process. We've found actually that it's not a big adjustment. Times it's a little easier because they have the visuals, and it's just a picture file that they move within the document. They can leave the pictures at the end of the document, or they can move them within the document.

And, again, very quickly, options for students. Taking notes for themselves, communicating with the service provider, adjusting -- did you feel, Lisa, that it was a big adjustment from the feedback for students with the Tablets?

>> LISA ELLIOT: No. The students generally picked up on this faster than we can figure out how to use our cell phones.

(Laughter)

It was not a problem for most of them, although there were a few students that were resistant, and I think that's to be expected.

>> Pam Francis: And lastly, students being comfortable with the technology, but as Lisa said they pick it up and go. Interacting with the service provider for some students who had never interacted with their note-taker was different for them. It was an experience for them.

Managing the visuals, knowing what to look at. Well, do I look at the laptop? Do I look at the teacher? they needed to make decisions for themselves, and the service provider was encouraged to discuss that with the student.

And getting training or support for note-taking because some of the students come in without any note-taking skills. And we don't assume that they will do any note-taking, but they have the options there so we encourage

them to do that. Okay? It really depends on the student and what they can do, and what they feel comfortable with.

And I thinks they it, and I know that we're out of time. One question?

>> Audience member: How are the students getting the notes after class? I know that this is middle school, so does the service provider send them to them via e-mail, or USB? And in the college setting, how do you perceive students getting those notes right after class?

>> Pam Francis: In the setting that we worked at the students were getting them either e-mail, the service provider would print them if they had access to color printer, because we encouraged the visual benefit of the color. I don't recall anyone using a USB in the middle or high school setting. At the college setting it's going To depend on the campus. Some will post on the Internet some schools have actual notes websites. Some will send them via e-mail. For example, a distribution list. It depends on whether or not they edit afterwards, if they bring a USB, there is no editing. So that really depends on the school. I think that the thing about that is can be done in multiple ways, and that's really a benefit. It really is what's appropriate for the setting.
It's not a one-size-fits-all. Sorry.

>> DR. JAMES DeCARO: Can I have the microphone?

>> Pam Francis: Absolutely.

>> DR. JAMES DeCARO: Thank you. Lisa and Pam, thank you very much.

I have to tell you that I find this to be very exciting because what's happening is it moves from learner being a passive receiver of text to an active processor in the learning process. And we know from literature going Way back that active involvement and processing really makes a difference in terms of teaching and learning processes. So the evolution of this system has been really exciting to watch and I think that there are even more interesting capabilities in the future, like tieing it into things like a smart board so that as the teacher writes it's right up on the student's screen.

So thank you very much. Really exciting. Very interesting.

(Applause)

>> Pam Francis. If anyone wants to take a look at it you are more than welcome to come up and take a look.

>> DR. JAMES DeCARO: Don't forget your evaluations, please.