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Welcome to RIT/NTID session T9C.
Instructional Software Tool:
A visual learning approach to conceptual barriers.
Presenter: Brian Trager and Joseph Stanislow

>> I have paper evaluation forms for this session that I can give, but I
encourage you to use the online evaluation form if you can. So with that.
>> All right. Thank you. Thanks, Bill. Okay, good morning, everyone. It's
a beautiful day outside. So we're excited for that. We're fortunate to have
that kind of weather here. Okay.
My name is Brian Trager.
>> Hi, good morning. My name is Joe Stanislow.
>> We are NTID faculty members here and we have been working with students
who are working towards an RIT bachelor's degree. We are part of the support
service team here. And we do a lot of one on one tutoring with the students
and sometimes we have group tutoring sessions. Sometimes our goal is to help
students understand their assignments so we explain the actual homework that
they are working on. But that's a big challenge in our field. Because each
individual is different. So what we've learned from our experiences together
with the many individuals that we have worked with is that we see a pattern
often in our students. Typically, we try to come up with visual
representation of a specific concept that they're struggling to understand.
We might use a board, an actual white board to help them connect the pieces
of the concept. So in our many one-on-one sessions, we came up with this
project. This project is called see to learn software. The goal of the
software is to help students understand programming concepts. When they're
learning those concepts, often they're abstract. So we need to find a way to
help them visualize these abstract concepts and make the connections they
need to fully understand.
I wanted to start with a quote, I'll let you read it. I'll give you just a
minute.?
>> BRIAN TRAGER: So one of my favorite books growing up was a Dr. Seuss book
and one of the reasons for that was because the pictures were colorful. As I
read it, I could make the connection and now my son is reading these books
today. I'll sit with him and we look at these pictures and the pictures help
him understand the concept. Now if we put the pictures away and we just had

had the words, the concepts wouldn't make sense. So this quote really seems to fit what we've been working on.

And this is really what we see in our jobs every day when we work with the students. Often when we explain it but we give them a visual to go with it, it helps them make those connections. Before we talk about the software that we're developing, I want to share with you a little information about research that we've found. And this is not a comprehensive gathering of the research. But there's some pieces that we found that we want to share with you that really is a basic foundation for why we're creating this software.

First I'd like to talk about learning styles. We have three different styles: We have auditory, visual, and kinesthetic. Which would be learning by doing hands-on approach.

So obviously, deaf and hard of hearing students wouldn't be able to use the auditory learning approach. 10% of the deaf students are kinesthetic learners so that leaves the majority of deaf students as visual learners.

So, if we're dealing with visual learners, it's interesting that the research that we have says because of hearing loss, it doesn't make the visual sense more acute. Rather, it makes the deaf student more dependent on that sensory input.

Visual learners like to see how the process is done. Often there will be that student in the class that says, "Can I see that again?"or that would ask you "Could you back up? I missed that." Maybe some of your students have asked those kinds of questions and that's an indicator they might be a visual learner.

Often students will use a visual representation of a concept. We could use graphs or charts and those are a big enforcer to help a student actually get the concept.

Now we know that deaf students are depending on their vision. So unless we develop a capability to control our eyes independently as deaf people, we will only be able to receive one source of information in the classroom. Let me give an example. In a typical mainstream classroom, you have the deaf student sitting and the professor who is speaking the lecture in the front of the classroom. Next to the professor, you have an interpreter who is interpreting what the professor is saying. Often times in class the instructor will utilize a Power Point or some kind of slide that will be projected on the wall. In a computer science class often we project the code or the students are having to look at the code on the screen. So the student has to make a choice: Do I look at the screen or do I look at the interpreter?

Regardless of the choice the student makes, they will be missing something. Okay.

So now I'd like to talk about direct versus mediated instruction. Let me give you some definitions. Direct instruction would be a one-on-one interaction where the instruction is going directly from the teacher to the student. It's not going through an interpreter. Or any kind of third party.

Mediated instruction would be going through this third person. For example, a teacher through an interpreter to the student. Okay? Now research has been done with very skilled interpreters. And it shows that deaf students still scored lower than their hearing counterparts. Now, I want to make sure that you understand this is not a blow against the interpreters. Or the services that are provided here at NTID. The point is you cannot have mediated instruction in a complete equal status to direct instruction.

All right. Let's talk about this instructional tool study. And really what made me think of this idea. Mark Marschark had a strategy of using adjunct questions and videotapes to find out what is working with a deaf student. The participants went through 11 lessons connected with the human eye. And I

don't know much about the human eye, but that's what they were given for their lesson.

And out of 144 participants they were divided by their reading skills in three categories. A low reading skill, middle, and high.

So there were three groups in this study.

Now here's a comparison of the scores. This is a comprehensive crunch of the numbers. Out of a maximum of 11 points, this was the breakdown. You can see here with text only -- with no other visual aids, just text, the scores of these students with low reading skills we had 5.6. With middle reading group 7.5 and high reading group 8.2.

Now, the other participants that had text, video, everything included, including sign, including adjunct questions obviously had a different score. You can see the difference in their scores here. So they averaged about 2.4 points higher, which would be a 22 percent increase. With the instructional tools. So obviously, the instructional adjunct questions created a big difference in the numbers. And this is the evidence that we use to see it's very important to use adjunct questions in your software.

Instruction is not the maximum -- the optimal option for instruction. You don't have to change everything that's happening in the classroom. But through this, we can supplement something to the current condition of the classroom today.

Now, obviously this will not work for everyone. This -- our original idea was not intended to be a one size fits all. It is not a magic wand that will transform all classrooms. But what we're developing in our development, we thought why not test students to see if this concept is successful?

Why continue something if it's not working, right? So we've done a small pilot study to see if we get the desired results.

The software we developed is user driven, meaning the user controls how they want to progress with the software. So they set their own pace. Every student learns at a different rate and in a different style. So we try to accommodate that. We have four different modules that focus on decision programming. And also advanced decisions.

We average about 12 slides for each module. And each includes 50 minutes of video. 30 minutes of adjunct questions. 30 adjunct questions, interpreter connection -- and 10 animated examples. We'll give you a demo in just a few minutes.

Now at the time of the pilot study, we had 14 students registered to an introductory programming course. 9 students were willing to participate in this pilot study.

The first test was administered to the students. And when it was done, it was collected. And then we would give the students the software. And they could two through it. When they were done with that, we would give them test number two. Which the same level of difficulty. The questions were different, but the concepts that were covered in test one were the same. We also did a survey based on their experiences and if we had time, we would share that, if not, we can pass that out for you to look at at a later time.

The second test had 14 questions. Each test had 14 questions. And one point was given for each question that was answered correctly. And it was a combination of multiple choice and fill in the blank.

This shows you a breakdown of the scores for each individual. Each of the nine students.

The blue bar represents test number one that was taken before we handed out the software to the students. And the darker, the black colored bar is the score for the second test. Looks pretty good. Now the average was 54% in the pretest. Now remember, these students have already learned the concepts in the classroom. In their mainstream classroom. These concepts have

already been taught and they scored a 54%. So I don't think any teacher
would be pleased with these results.
After the software had been given to the students, their scores increased to
71%.
Now maybe you saw student number 5 whose second score was actually really
low. That was an interesting situation that I'd like to comment about.
However, if we didn't include number five, the pretest score would have been
57%. And the post test would have been 78%. Which would have been a
21 percent increase. 8 of the 9 students did better on their second test.
And you saw one participant did score below. The reason for that is the
student was in a hurry when taking the test. They went through everything
very fast and turned it in, in a rush. The student seemed to have other
things to do. And so that shows this software is not a magic wand. And it's
something you have to invest time in the software to benefit from. The other
participants averaged 75 minutes and this student number 5 had 20 minutes
less invested in their test. And this includes a weeks worth of lecture.
So the average of the 2.33 -- so there was an average of 2.33 of an increase
on the post test. And it went from 54% to 71%.
So it seems to be effective with comprehension. We saw an average of 17%
increase and without that one student number 5, we would have seen a 21%
increase. Each of the 9 students showed improvement. And in essence would
pass because of a higher than 70% score and I think any teacher would be
pleased with that. Now that I've explained the concept, I'd like to take a
minute to show you the software. Are you ready?
>> Joe is going to participate now and he's going to be our quote unquote
student for this part of the presentation.
>> Hi, I'll be the student.
>> BRIAN TRAGER: Are you feeling young today?
>> JOE STANISLOW: Very young, thanks.
>> BRIAN TRAGER: Joe will start with the first slide which is a topic. You
can see we have the four topics we can choose from and he's going to pick the
decisions and end statements topic. Now what you see is an example of the
screen shot for the learning tool. On the top left is a videotape, a video
clip. It does not automatically start when the page is loaded. We want the
user to choose when they want it or if they want it. And when to start it.
Remember, this is user-driven software. So we want the user to be in control
of their learning experience.
Everyone learns differently and everybody prefers a different style and
sequence in their learning. In the right hand window is the text
description. And we have a navigator menu bar on the left-hand side. Often
times with traditional computer-based instruction software, there tends to be
linear -- a linear experience, meaning a person looks at the slide and then
there's just a navigation bar to the next slide and you have to follow the
sequence from beginning to end. We decided to put this navigation menu in to
give students the ability to choose where they would like to go so the lesson
wouldn't become boring for them. So there's options for them. Maybe the
student when they use this learning tool knows some of the information that's
being presented so they can jump ahead and they also can go back to previous
segments in the software if they missed something or feel like they'd like to
revisit a topic. Now Joe's going to start the videotape.
>> JOE STANISLOW: Do you want me to start with a simple "If" statement?
>> BRIAN TRAGER: Video says hello, we're going to talk about if statements.
Before we talk about if statements, we need to talk about decisions made,
decisions we make every day. When you go to class, sometimes you walk,
sometimes you drive.
>> JOE STANISLOW: Also if you don't want the captioning, if you find it
bothersome, you do have the option to turn it off.

>> BRIAN TRAGER: The video is continuing. If it's raining, you might decide to drive rather than walk to class. Another decision we could make is when we have to go to the gas station when we need gas. On every Thursday night at 9:00 o'clock, I watched a television show called "CSI" if you know you have class in the morning, you know you need to get up early. And so maybe you'll watch that TV show, get up early and sleep in the afternoon. These are decisions we make in our everyday life. Computer programming is the same way. Brian's saying so you can see the video instruction is really an instructional tool directly -- direct instruction to the student. If the student isn't clear about what's happening in class, they can use this learning tool and it's going to direct the instruction model from an instructor directly to the student person who is not comfortable in sign language can turn the captions on and read the captions. In some way this is a bilingual bicultural approach because we're providing the sign language but also we have the printed English text as well. Joe? Continue.

>> JOE STANISLOW: Next, you can head to the question section.

>> BRIAN TRAGER: Joe can progress at his own speed. He can choose to read the text on the right and   when he's ready, he can click the next button. Go ahead. Here's one of the questions that pops up. Now, if he does a good job and he knew the answer to the question, then he'll answer correctly. But notice that next button is grayed out meaning the student must answer this question. They don't have the option to click next. So, if the student is not sure, the student can click the previous button. But they can't go further ahead. So Joe, what's the answer to this question?

>> JOE STANISLOW: I'm not sure if I studied enough. Let me look.

>> BRIAN TRAGER: He clicked on the correct answer and he was given that feedback. Good job, good work, Joe.

>> JOE STANISLOW: Good.

>> BRIAN TRAGER: Now Joe has decided that he wants to learn about expressions, so he's clicked on that link and I has the next now on the right and video sample in the upper left-hand corner and again, Joe can choose to look at the videotape and see the explanation if he so chooses.

>> JOE STANISLOW: You want me to go in the video?

>> BRIAN TRAGER: It's up to you. Go a ahead.

>> JOE STANISLOW: Since I'm familiar with this concept already, I don't have to go to the video, I can jump ahead to the next section.

>> BRIAN TRAGER: So here comes an adjunct question that he must answer. He got the wrong answer. So now he has the wrong answer so he can't move ahead. We want to make sure he understands the concept before he progresses further into the lesson. Do you want to try to answer again or go back and restudy the information?

>> JOE STANISLOW: Because I made this error, perhaps that indicates I need to go back and read the section again before I move on. So I'll back up.

>> BRIAN TRAGER: I'm sure some of you have seen these before. "If" statements with flow charts. This flow chart is a visual representation of the concepts contained within an "If" statement in a program. So we have the symbol showing the condition, the graphic itself is not complete. What we want to do is show the student how the actual "If" statement functions as part of a whole.

>> JOE STANISLOW: In a classroom with direct instruction, they can explain if something is true, then it will lead to this effect. And if it's not true, then the action will stop. And sometimes that abstract concept is not clear. So we've created animations in this program to help students get the full picture. I'm going to pick the true option. So then seeing a visual representation of this would help me comprehend the concept.

>> BRIAN TRAGER: Because the condition is true, then run statement 1, now pick false, Joe. So because it's false. When students see the animation,

they sometimes understand the concept better, if it's true, it runs statement 1, if it's false it skips it. Maybe you learned something this morning as well.
>> JOE STANISLOW: Do you want me to do example 1?
>> BRIAN TRAGER: We'd like to show you example one. The teacher already taught the concepts and now we're going to apply the concepts. Click on the animation, please. If the student misses this the first time, they can always replay the animation.
>> JOE STANISLOW: So for that student asking can I see that again, this is the perfect fit.
>> BRIAN TRAGER: You have to click animation again, Joe. So the complete animation will replay itself. What's important is not every student will really get the concept the first time and they may need to replay it several times and this software allows the student, es especially the visual learners to replay this so that they do understand the concepts and make the connections that they need to make to learn the material.
I would like to show you what happens to the value. See the value has now changed to 13, before it was 17. So obviously the condition will become false. And let's see what happens. Go ahead and animate.
>> JOE STANISLOW: Do you want to show the video? I'll show you the video first.
>> BRIAN TRAGER: Okay.
Go ahead and click on the video. The video is saying now in example to let's change the value of my age to 13. Before it was 17. We're going to change it to 13. Let's see what happens during -- in the false condition. In the animation you'll see the variables let's see what happens when the age changed to 13. Will it be true or will the condition be false when my age is 13. We know my age is 13, is that greater than 16? No, that's false so let's see what happens."
Okay, Joe decided to pick something else. So he's moved on. The students tended to as we said choose to spend about 45 minutes on these modules. We know that time is running out and we can't show you the survey results. But the survey results are in your handout and you can read them on your own.
Okay, well thank you, if there are any questions, we'd be happy to entertain them at this time.
Took a long time. This software was developed from scratch. It wasn't something that was already made and then I just adapted it. I developed everything from scratch. Took about 150 hours to develop what I've developed so far. And Joe is saying what software did you use? The software I used, Brian is saying, is Macromedia director. I'm not sure if you're familiar with that in the audience. The videotape I used Apple Quick Time videos and in order to make the captions work, I used and old program called notepad. Everybody's probably familiar with that.
>> Question: Suppose you want to develop a new list of topics where you'd have to make a video, would that be easier now that you have the foundational structure of this program?
>> BRIAN TRAGER: There's some areas that I'd like to improve including the XML. XML is a way to preserve data and to make it scalable and easier to store information.
>> Students use this in response to the class. I'm wondering if you can see any information like how much time they spent on it, what options they've used, what areas they repeated the information? Anyway to track that data?
>> BRIAN TRAGER: There's nothing like that at this time but that would be really good. Thank you, that's a good thought.
Not that I know of. His question was this kind of software, are there other subject areas or disciplines that are using this. And my response is not

that I know of. There is study that I showed related to the science
discipline. Yes.
>> BRIAN TRAGER: Well, I haven't really thought about that. At this point in
time, or at the time when I created this, there was no other software that
was capable of doing something such as this. So I was developing something
from the ground up. Hoping to use it with the students that we have been
working with on a 1 on one basis. But I do know that there is a software
called adobe Captivate that could do something similar to this. You don't
need to know programming. You -- it's very easy and user friendly. And you
can use graphic interface programs to play with it. So the hope would be
that that would be there and all you would need is a camera to make the video
and the materials to put it in the program. Do we have time for one more
question?
>> Question: Will you be adding any user input for example to let the person
input their own age? And then they can see the results of what would happen
from their own data?
>> BRIAN TRAGER: I haven't thought of that. But that is something that would
be easy to implement and to add to this program. Yes. All right. Thank
you.
>> The conclusion of this session. We'd ask you to please fill out the
evaluation forms that I have here and leave them by the door. The number for
this session is T as in Tom, 9, C as in Charlie. Please put that down on
your evaluation form. Very helpful. Thank you. If there are any other
questions for Brian or Joe, you can talk to them out in the foyer. Thank
you.