

SHIRLEY RYAN ABILITYLAB
WHAT JOB SEEKERS WITH DISABILITIES AND EMPLOYERS
NEED TO KNOW ABOUT JOB ACCOMMODATIONS

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>> EDWARD HITCHCOCK: Thank you very much. Close to afternoon, I suppose. I'm Ed Hitchcock, an occupational therapist. I'll be talking a little about general accessibility and what is called assistive technology.

I am an OT, so I'll be talking about a few things that kind of cross into the speech therapy realm today, but probably mostly be focusing basically on kind of vocational rehab, and some of the items that might be more commonly used to allow people to return to work and so on.

The general context of what I do has been largely three major areas. I work with augmentative communication. If someone is having significant difficulty with their speech -- sorry, I have to make sure I'm not attached to a wire one way or another.

If someone is not able to speak, we work with a variety of devices that may -- or techniques that allow people to communicate.

Obviously employment, communication is more or less a prerequisite, so that might be something we would do significant work with someone on a return to work basis.

I will be focusing a little more on computer access and that being the thing most people are going to use for work, but we'll touch on some of that.

We also work with what is called environmental controls. If you're having difficulty using something like a telephone or a lamp or a fan or even things like a television and so on, there are various options that allow somebody that has upper extremity impairments or visual impairment, for example, to do those things. We'll be focusing mostly in the context of the workplace, given the nature of the lecture.

I gather it's fairly entertaining me to watch me lose my train of thought. If you have a comment or question, feel free to throw up a hand or indicate it to me. And we can try to address that.

I'm going to go a little bit mile wide and inch deep in terms of the techniques and the options that I present with some hope we'll be able to circle back at the end of the presentation, if you've got stuff you want me to show more in-depth, then I can try to do so.

But those are just a few of the ground rules for the lecture.

A little more about me. I am an occupational therapist. I work in the in-patient units here for a few years before I started assistive technology in '99. I've been doing full-time assistive tech for a long time. It's a -- I kind of say it makes me a slightly large fish in an exceedingly small pond. But it's just not places that give the opportunity to do that and practice that, especially have access to the actual technology while it's here.

So that will be something that we can kind of, you know -- it helps me also to know there are other stuff out there, like people using this stuff in their environment, because all of my work is basically done in the clinic. So I appreciate some of the back-and-forth as we kind of go as well.

So, mainly we're going to be talking about what we talk about a lot within the department, and that's essentially known as access. So that is how does somebody operate a given piece of technology? How does somebody use a specific piece of technology or adaptation in the most efficient way possible?

We talk a lot about efficiency. I see a lot of people who might be able to, for example, use one finger to type, right? And obviously that's a way to do it. But I also spend a lot of time talking about the efficiency. If I'm thinking about competitive employment, I will tell my patients that, you know, in general one finger at a time, you need to figure out some way of getting faster with that, right?

So we talk a lot about the efficiency angle to that. I talk a lot about the subcognitive portion of access. If you are a touch typist, meaning you type with all ten fingers without look at the keys, if you're a good touch typist, we often talk about that being a subcognitive skill. I don't need to think about where the keys are. My fingers pretty much just go there at a subcognitive level. In fact, if you ask a really good touch typist, where is the V key, they have to scan the whole keyboard. They don't know where it is. But their finger will go right there. And that's what we call a subcognitive goal. So I kind of want my access, as much as possible, as you'll see some of the things I show are maybe not realistic for that. But as much as possible, I want that to be at that subcognitive level to make somebody as efficient as possible.

I mentioned a little bit about assistive technology and the goals that are related to it. Obviously if it's a return to work situation, there's a lot of options kind of across the board that we'll be doing with there and I'll get into those.

So we talk about the goals for technology. Again, you know, I work with a lot of patients, so inpatient and outpatient basis, and somebody might not want to be at the

subcognitive level for the most efficient way possible. If somebody just wants to type a message to their family member, "what time are you home," they may not need to go through the in-depth options I have available. Because it may be fine for them to type one at a time and maybe that text message takes about a minute to send, but that's fine.

I want to know what are the goals. If you want to lose this for competitive employment, we might need to up that game a little bit, right? But if somebody doesn't want that, that is going to be kind of important.

I have a lot of people who think the technology is kind of cool, right?

iPads, iPhones, they're kind of cool, right? I get a lot of people coming in and they want to use it and it's kind of cool. And that's not -- you know, the human factors that go into using a piece of technology are really actually quite important. If something doesn't look well, if somebody has -- you may know this, they're not the most esthetically oriented person in the world, so I may not care, but if this piece of stuff hanging off of me doesn't look good for someone, that's going to be an important factor. And a lot of that goes into what we call technology tolerance. Back in the old days when we used to have VCRs, we used to say if you were someone who can remote program your VCR to record a show at a later time,... who knows VCRs?

If you can remote control your VCR to record a show at a later time, we used to say you had a high technology tolerance. You're probably going to see at various times today that something will go wrong with my technology, right? And if it does, how do I deal with that?

Nature of my job, I'm kind of good at that. But if someone doesn't have that option for technology tolerance we have to look at that in terms of the reliability of what is there and set up the expectations around that.

Briefly, I obviously need to know what is going on with someone's vision. That's a pretty profound issue, no pun intended. It's often overlooked in the rehab field. If there's relatively minor visual deficits, it will have a pretty profound influence on the use of a screen, right? I want to know about cognition, new learning, short-term memory, are there options I need to use? A lot more options are available now just on your smartphone for things like reminders and calendar appointments and things like that.

To try to compensate for some of those issues. I spend a lot of time talking about upper extremity impairment, because that has the influence on how I am operating my given piece of technology, right?

I'll talk a fair amount about positioning and ergonomics, although that's a little basic level. I'll talk about those things as we go. Briefly ergonomics at a basic level. I often say I want to avoid long periods on a laptop. A laptop, no matter what way you cut it, is a bit

of an ergonomic nightmare. I either have hands up to where I can see my monitor comfortably or my hands are down and my neck is forward

So I often talk about some of the simple things. Let's move the monitor up so I'm not in a posture or having to go in this posture of going up or down. Kind of a few basic things like that.

We talk about changing position a lot. Can you stand up part of your day? A standing desk is important for some people, if there's a pain issue, but also for general principles.

Can I change my position, one of the other up or down so I'm not relying on the same groups of muscles at all times? Same thing with changes of task. Hey, look, just getting up and taking a water break so I can walk down the hallway a couple of times, you know, maybe once every couple of hours, is potentially going to make a big difference to ergonomics. So some of the basic things like that.

A little more in-depth, basic or more or less prerequisites. I'm calling this sort of the prerequisite stuff, but realistic almost anybody should think about. I'm wearing reading glasses at this point in my life. I didn't need them until a few years ago. Probably would have been beneficial for me to be magnifying my text a lot earlier than I actually did.

Because I started to notice that I was kind of straining and having to keep stuff farther away. Finally I got to the end of my arm and that's the time for glasses, right?

But I probably could have benefited from some magnification a little earlier.

A little bit about positioning. There's widely available just plain old tablet mounts if you go to the micro-center or Best Buy. Wall mounting, projecting to an HD TV, all that stuff. It's really readily available at Best Buy or Micro Center or something like that.

So give a little thought to that in terms of basic stuff.

A little bit about my more specialized kind of role. I'll get a little more into what we call feature matching. So, again, kind of... I often have to tell clients I'm not IT. I also don't work for Best Buy. That's not my job. My job is a therapist, is to try to understand what are the issues, deficits and strengths you are dealing with, and then we go through a process called feature matching, which is identifying the given pieces of software or hardware that really take advantage of the strengths and/or compensate for any deficits.

So that feature matching process is kind of the key to what I do as an OT as opposed to Best Buy who says, here is an iPad.

Client preference, I kind of mentioned earlier, that's a human factor that is really very critical to the adoption of technology. If somebody doesn't like the way it looks, doesn't like the color, doesn't... you know, something looks kind of goofy or they just prefer not

to use a given thing, that honestly is going to be the most important case for adoption of technology or not.

I talk a lot about trials whenever possible. I try to get somebody to do a trial. I see a lot of patients who don't have funding for the equipment that we talk about, so even a relatively small amount of money can be a big deal to someone if they're on a fixed income. So I spend a fair amount of time figuring out how to get a free trial or some other ways of getting stuff free before I ask somebody to purchase software.

By the same token we try to do purchases with return policies. Just makes life easier when possible.

So a little more about some of the goals. I mentioned briefly earlier that I would be talking about communication. If somebody does have -- you know, communication, obviously, we talk about --

Of course.

Pay no attention to the man behind the screen, right?

Should I keep talking?

Okay, sounds good. I might have stood there for quite a while more.

So, yeah, communication. Obviously if somebody is verbally having issues, it may be a situation where someone cannot speak at all. It may be a situation where somebody might be able to say some things but might not be able to get, like, a longer or more in-depth communication out.

Or may be a situation where somebody needs clarification on relatively advanced topics, but even on a face-to-face level we try to have an option available for communication.

So a speech therapist and I will get together in that event to talk about which devices will be most effective if someone has a significant speech issue. I'll be demonstrating one of those devices a little later on.

But there's a whole... it really is its own lecture. Obviously the language deficit, and obviously communication goes way beyond the workplace. So we will spend a lot of time talking about that. But at any rate...

Linda, if you don't mind, could you give me a heads-up at about 12:40, because I don't have a clock up here.

Thank you very much.

So face-to-face communication is kind of its own thing, if there's a significant speech deficit.

With or without speech deficits, obviously being able to use the phone, texting has gotten much more integrated into our working environment, I think. Obviously doing Skype or FaceTime or audio or video calls over the Internet. Social networking has become a lot more important to some people's jobs, right? Some people, when I started in the field, we didn't have Facebook. Now there are whole jobs that are influence mediators.

Those are important and might be things I handle with assistive technology that people might have goals for.

Coming back to the communication devices and how those kind of integrate, they are essentially designed for that face-to-face communication, but they also will handle a lot of the phone, texting, etc., etc.

So if I connect my phone, I can text message through my communication device.

So if I'm not able to access my phone directly, maybe I'm using my communication device to do that.

I can email. In general, those devices are a lot more expensive and they're not necessarily suitable for everyone. Right?

In general I talked about funding a minute ago. Most of what I deal with is not funded through health insurance but communication devices are.

There's some hoops we have to go through. It's not dependent on employment. It's dependent on medical need. So we can usually get that done.

There are those options for computer access and environmental control, but I will say they are really designed best for face-to-face communication. The rest of the stuff, it's a little like a Swiss army knife. Technically speaking you can build a house with a Swiss army knife, right? You've got a saw, a screwdriver. You can use it as a hammer. Should anybody actually build a house with a Swiss army knife? Probably not, right?

So it does a lot of different things. Not necessarily very well. But it's an option, and that would be something that we'll use. In fact, it's a big issue with the adoption. I do have people who don't want to depend on a device for face-to-face communication. But they use them for texting. So be it. And that's great. And I think we should use it that way. Okay?

So I won't talk a lot more about the communication stuff specifically, but we can circle back around to that if there's questions.

Computer access. Obviously being able to do email, Word processing, reviewing documents, generating documents versus reviewing documents are obviously distinct goals, and there are very different tools that might be used for that, right?

Internet access is pretty much a prerequisite for employment at this point, right?

Does somebody need to get into databases or spreadsheets?

The quickest way to watch me turn white is to have a patient come in and ask me, how do I get into Microsoft Access?

I have no idea how to use that program to start with. I'll find the tools that will let you do it, but I'm glad you know what to do in that program.

And there are options that will allow you to do that.

So a little about some of those tools. I'm going to kind of briefly go through different options and show some of them as we go. Keyboards for accessing a computer or a smartphone or what have you. Obviously the size can make a difference. There could be small keyboards, large keyboards, and so on. Just real briefly. Where did it go?

This is a big keys keyboard with a Keyguard on it. If somebody wants to tap away at it, we have them upstairs. Basically, obviously, as the name implies, it's a computer cue board with fake keys. For perspective, this is like a standard desktop keyboard that you probably all have at your desk or laptop versus a smaller keyboard.

So sometimes the size makes a big difference. The Keyguard is just the plastic overlay that fits over it. I have a lot of people with a tremor who they might not be able to kind of get to the keys if I had this off, they would be hitting all the keys with their whole hand. But they can get to where they want and then hit the individual key with one finger.

Keyguard can make a big difference for accuracy in that sense.

So Keyguards are often helpful.

Configuration gets overlooked a lot, but if I have a one-handed typist, sometimes there's a con fig which is in the software of your operating system, I think the Mac also, but puts closer used keys to one area versus the standard what we call the QWERTY layout.

Maybe we might consider different layouts.

Physical versus onscreen. Obviously touch screens with keyboards on them are relatively ubiquitous at this point. And that might be an option that people could use. There are a variety of specialized one-handed keyboards. If I have someone using only one hand on the keyboard this is commonly following a stroke, we might get into one-handed keyboards.

A bunch of different options along those lines.

Quick questions on keyboards?

Anything anybody uses in particular?

That I didn't mention?

All right, let's talk about mouses. One of these years I will learn the plural of computer mouse, but I haven't figured that one out.

Touch screens are relatively ubiquitous. There are a variety of options for using your hands on a mouse, above and beyond kind of your standard desktop mouse or your track pads.

If I'm using it with an upper extremity, maybe I don't have good isolated finger control. There will be options like track balls and things like that that can be helpful for a lot of people. I can use my head. I can use my eyes to control all of those options.

Dwell clicking will make a difference to some people. Rather than physically clicking the mouse. I should explain. Rather than physically clicking the mouse, I bring the mouse cursor where I want to click and hover for a pre-determined length of time. Might be one second or half a second, a second and a half, whatever.

Software will automatically send a click. So that's what I mean by dwell clicking. I might use that with all of the different types of mouses.

I had a coworker, relatively common pain issue, that someone can move the mouse around just fine but they develop a lot of pain when they click the mouse. So dwell software is sometimes a simple easy way of fixing that.

I'll talk a little bit -- yeah, talk tremor for a minute. Lots of times just changing the position of the mouse, sort of an ergonomic issue, but if I have trouble bringing my arms up. I have a lot of people successful using a variety of mouses just in their lab on a clipboard as opposed to coming up to a mouse station, right?

Tremor, if somebody does have a tremor which is a relatively common issue, for a variety of perspectives, quite often one of the best things you can do is just a regular desktop mouse. In the therapy world we call it a closed circuit, but if I have a tremor and I'm trying to keep my arm in the air to reach for a target, the tremor is really influenced. If I put my hand down on the table, on a desktop mouse and keep the contact, that often does a lot to minimize or eliminate my tremor. Sometimes the standard desktop mouse

is the best option, because they're not having to constantly lift off and on like they would with a track pad or a track ball, okay?

Mouse keys, if you have a dedicated number pad on your computer, so if you're on a laptop you might have to add it, or it's just a standard number pad on the right-hand side of the keyboard, you can use those keys to operate the mouse. It will do up, upper right, right, and so on, around the seven or eight keys that go in those directions. That's often a really nice option, again, for someone with a tremor. They have a hard time getting to the target. They have a hard time with constant lift on lift off, but they can hold the mouse down and it works nicely. That's included in your operating system. So free. And widely available.

Steady mouse software is available as a download. Most people are familiar with track pads. Mary Beth, would you mind grabbing a track ball from upstairs? I'll show a track ball in a minute when it comes back down. But a track ball is a nice option for someone without isolated finger control. Because, again, it allows me to control a relatively large roller ball with my relatively gross arm motion, or if I, for example, have had an amputation or something like that.

So those are all options, again, dwell or switch clicking are available. By switch I mean a variety of different buttons. I use this one for -- obviously it's easy you see in a large environment, but they become a lot smaller, and I can connect this to my computer to send my clicks. So if I'm somebody that wants to click with my leg... that's an option we might use. Maybe I'm moving my mouse around and then clicking with my leg. A bunch of options on those lines.

I knew I was going to get hung up on a cable at least once today.

So let's talk about head activated mouse for a moment. This is an option called a tracker pro. I'm going to put it on my computer here.

It is USB and plug and play. I'm progressively running into more and more issues with information technology professionals not wanting me to install adaptive software and stuff like that. So those are issues that we might have related to all of this. Excuse me while I do a couple other settings here.

So this track ball -- I apologize. I'm hoping you'll be -- you might not be able to see this. You might have to trust me. But we'll see.

Okay. So the... there we go.

So the way that the Tracker Pro works is there is a small reflective dot at the center of these glasses. As I tell various people you don't have to wear these glasses but I do offer a free photo shoot of you with them on and post it to my Facebook page. Any volunteers? Crickets... crickets will

That dot at the center can be worn on your eyeglass frame, just a reflective dot. In the case of the Tracker Pro, I believe it is active infrared, meaning it's broadcasting an infrared light which reflects off the dots.

If I start showing a video and it doesn't show up on the screen, please feel free to let me know that.

I love how PowerPoint takes over your computer sometimes.

So I'm sort of hopeful that is my mouse on the screen. I'm sort of hopeful that you will be able to see that I'm moving the mouse around on the screen. Is that visible at all?

Great.

So I have the mouse upside down. I move my head up and my mouse goes down. Aren't you guys impressed? If I put my mouse in the right direction -- by the way it is traditional for assistive technology to fail at least once miserably in front of large groups of people you're trying to impress. It's all part of my plan.

But that head mouse allows me to move my mouse cursor around on the screen. And when I hover over whatever it is I want to click on, I can click the aforementioned dwell software or using my click or what have you. I have a lot of people that use head motion adequately to allow them to control the mouse cursor on the screen.

By extension, I should have mentioned earlier, there's lots of ways to use your keyboard to activate mouse functions using mouse keys or using keyboard shortcuts. So if you are somebody that does really, really well with the keyboard but the mouse is hard, one of the things I might look at is figuring out how to use your keyboard to operate the computer. Vice versa, there's nothing stopping me from using my mouse to type on an on-screen keyboard as well. Those might be options we consider using. Okay?

All right. There are -- just to briefly talk about some of the situations I have run into, again, aforementioned issue with software being administered and installed, if it's a larger company, we often have difficulty dealing with that. I'm very happy to work with some very fine voc rehab professionals who can kind of help me advocate for some of that. In terms of talking to IT departments and saying, hey, this is a reasonable accommodation. You need to get this software installed so this person can work, right?

As we know in practice sometimes it takes a while. So if I can have something that doesn't require that additional software, that is a factor. And the Tracker Pro is plug and play. I plug it into pretty much any computer in world and it will start working without additional software.

So that is something I will kind of consider.

I mentioned the infrared issue earlier. I worked in clients with sunny offices and the sunlight knocked out the infrared capabilities, so there's nice know if there's Bluetooth connection or gyroscopic option, so that makes a difference in that office environment, right?

XY differential. If I'm somebody that has a lot of difficulty moving my head up and down, but I've got pretty good right to left, some mouse programs will allow me to change the relative speed of the horizontal motion versus the vertical motion. To make it a little more accurate and easy for my patient to access the whole screen.

So those are options that we might think about or consider using.

Just a few examples what I just talked about. And I should say, again, I'm not Best Buy. But I did try to include some brand names of the products in here. So if you're good with Google, you probably can find someone who will sell it, but obviously you're welcome to contact us or talk to somebody in the assistive tech department here, and my email is in the presentation. But if you are specifically looking for a product, I tried to write the brand names in here with one exception, which I'll talk about, okay?

And, yeah, these are just a few of the different examples of some of the more modern options out there.

So electronic eye gaze. So I'm not going to be able to show this very effectively. It's just kind of really tough to do it to a large group of people. But if people want to come up and either try it or watch me do it a little more, we'll try it with my camera in a minute.

There are various eye gaze systems that are available. As the name implies, they track your eye movements. Wherever it is that you look, you can then kind of control and/or type.

They are relatively expensive. They're getting a lot cheaper. We used to be \$25,000+. At this point I can get a functional eye gaze camera for computer access for 8 or \$900. There's one that is about 150 which I'm using for training, as well as thinking about as a supplement for people.

So they are relatively expensive, but nonetheless it's getting better.

The new -- has anybody tried the new iPhone eye tracking?

I'm told it's there. I'm guessing it's not very good, but interested to see. A lot of this stuff is getting integrated a lot more just into the world, right?

Sometimes they're difficult to use for standard computer software. I will demonstrate that in a minute. I'm going to show you how I use it with communication device software, which is just a little bit more integrated with eye gaze.

So I should add this augmentative alternative communication, that's what I was talking about related to speech deficits earlier, but this software is where I show eye gaze a little more effectively.

So let's give that a try. So, again, I want to make it clear I'm doing this under the influence -- so you can see it on the camera. Remember everything I said about ergonomics earlier, you would not do it the way I'm doing it right now. But basically, if I'm positioned in the right spot -- you can just stick it up on the table. Thank you very much.

If I'm positioned in the right spot...

Can you guys see the relatively large red dot that is swinging all the way around on whatever it is I'm looking at?

>> AUDIENCE MEMBER: Yes.

>> EDWARD HITCHCOCK: Great. It doesn't help that my device is vibrating. There we go.

So I'm obviously in a really awkward spot here, but I'm typing by staring at my letters. That's an example of the dwell software.

So I am typing at the O or I'm looking at the O. I just got the P. So I'm just going to back space. Oops, I don't want to clear everything.

I do want to be clear if I was better positioned, probably would help if I recalibrated to the environment that I'm in. It actually interestingly enough, I'll try it again, thank you for doing that. I will try it again.

It's reflecting.

So I will try it again, but probably we just made it harder for me to use it by turning off the lights. But it does make it a little easier for you guys to see perhaps. Or maybe it's better.

So if I finish typing, you might not be able to see that I'm using word prediction, which is another option. And that says "is." And example. So I'm going to type in using my word prediction. Now I'm going to type E, X... I'm going to back space that. I'm going to cheat because I want to see if I can get the word prediction.

So now I have word prediction available on my second button there.

Eye gaze technology.

So basically if somebody would like to see that a little more -- a little better demonstrated, happy to show it afterwards, but it is a little tough to use in the context that I'm in right now.

All the things that I just mentioned, a difference in lighting is potentially going to make a big difference. To say what is happening is it's basically I go through a calibration process where I look at a series of dots on the screen. A camera tracks the eye -- my eyeball and takes a picture of it in each of the positions. After that, it can algorithmically tell where I'm looking on the screen by the nature of the pictures that it took.

When we turned off the lights, my pupils got larger. So that changed the picture that it got, right?

So that can be an influence on the eye gaze, positive or negative.

I mentioned the positioning. The positioning is obviously a little awkward because I'm trying to get it on camera, etc., etc. But you can see it still kind of works. If I have it better positioned, that will make a big difference. One of the things I spend a fair amount of time doing is training people to kind of recognize all of those different issues that are going on.

So we'll circle back to that in a little while if people are interested. But that's kind of -- I want to move on to a couple other things.

I can use it -- you saw me using it to type on a standard keyboard. Sorry... on communication device software. Relatively large buttons. I can, if I'm more appropriately positioned type adequately on the standard Windows keyboard, so I can do typing in the Windows environment. There are various ways to allow me to access options in the Windows environment as well. That's a couple of Mac options out there but they're not as available.

If you are a notetaker or you want to email me, I realize I neglected to put the brand names of kind of the some more common products we work with, but this is a Tobii Dynavox I series. Stuff is changing all the time. Literally don't have a picture of the newest and most up-to-date device that got released last week. If I give this presentation again next week, I'll have those pictures. It changes in the world.

And there is another vendor in the local area.

If you want to follow up on those later on, you can.

Some pictures of some of the different eye gaze devices.

I want to talk about smartphones and access to smartphones from a physical and cognitive and visual point of view.

You might recognize this as -- you know, if I remove apps or rearrange the icons I can make it a lot easier for somebody to access the device.

iOS interestingly enough is relatively limited as far as what I'm able to do, because the system kind of locks me out of a lot of the things I would like to be able to do, but sometimes I drag unused apps to folders or delete them entirely if my patient is having a hard time with accidental activation of an unwanted app or what have you.

Home screens on Android devices actually give me more options because I can take items off the home screen entirely if I don't want them there. I can use one home screen. If I've got somebody with that bit of a tremor and tend to wind up swiping their device from left to right, I can get stuff down to one home screen. Using widgets, which are options to make things essentially bigger and present some information or an option, I can make the icons larger. I can also resize a lot of things.

So just for perspective, this yellow square up here is the size of the standard icon. On Android I can make bigger ones. I can make a full screen one. This is set to direct dial my wife, so I can hit that relatively large icon to call the people I'm most commonly calling rather than trying to get into the contacts.

iOS has included very recently similar options but they're relatively behind on what one can do with Android.

So, thinking about using a stylus, again, if I'm somebody without that isolated finger control, I can often do things with my stylus that I can't do with an individual finger. I can use a mouse stick. I have a couple of users that are extremely effective using a mouse stick, is a -- using a mouth stick. Which is a stylus they hold in their mouth and they can get around their smartphone pretty much as fast as I can with my fingers. Some people get very good with them. But there can be an option that way.

I talk about real briefly if using a stylus, if you ever tried to use your smartphone with just regular winter gloves on, you know how it doesn't actually work? Because it's requiring that conductivity from your finger. If you are using a stylus, if you have something that you're holding it in or you have a mouth stick with a plastic piece that eliminates the conductivity, it will work better if you run a wire between your skin and the tip of the stylus. Where you would normally hold the stylus. Consider those conductivity issues.

I'm going to... how am I doing on time? I'm going to talk about speech recognition.

So probably or possibly a lot of people have heard of Dragon for Windows, Dragon naturally speaking, going back a little ways. It's often oversold in what it's able to do. Speech recognition in general has gotten significantly better over the years. So I will say that if you're someone who used it 15 years ago and said... uh, doesn't work, it might be worth a revisit. But there are a lot of things that go into speech recognition when using it adequately. So I try to talk a lot about formulating my thoughts. A little outside of the

context of this group, but I get a lot of students, and people will say, oh, they're so verbal, they'll do great with speech recognition. But unless I'm really able to speak out kind of what I want to say in a smooth and relatively measured pace, speech recognition will not work well.

If I'm trying to use it on more of a conversational basis, it will generally tend not to work as well.

It's gotten a lot better. I sit here and I look at the transcribe issue that we're using here, and I'm not actually watching, but it's generally probably pretty good, right?

But nonetheless, there's a lot that goes into that. And if I'm trying to use it for the computer, if I try to say my middle name, let's see how it does.

My name is Edward Cady Hitchcock.

So as it always does, along with the bullies in the fifth grade playground, it misspelled my name as the girl's name, K-A-T-I-E. My middle name is actually C-A-D-Y.

So that is one of the things that Dragon will allow me to do to fix what a standard speech recognition package will not. But I have to know how to do that. That's one of the things I talk about when using something like Dragon versus another program.

I spend a lot of time talking about dictation strategy. So for the record I actually use Dragon to do my own clinical documentation pretty routinely. I am perfectly as a touch typist but I prefer Dragon at this point in my career.

Very first time I tried to use Dragon to write a note, I had been writing notes and if you asked me to do it with handwriting or type it out, I would beat out a note in ten minutes, no problem. I had been doing it a while at that point in my career. First time I tried to use Dragon, I said "client... client... client... utilizing...

It took a while to get to the point where I could smoothly dictate something like "client utilizing Dragon for Windows to accomplish dictation strategy to type an email with moderate verbal cues.."

That sentence that I just spoke took a while for me to develop. It's a cognitive process of thinking to talk to type is simply distinct from the cognitive process of thinking to type.

If you aren't a very good writer to start with, Dragon is not going to help, right? You have to have a fairly decent idea of what it is that you want to say and communicate.

And then that will make it a little more adequate.

There was an interesting study done by the Automobile Association of America and they did a study on the most distracting things you can do while you're driving. It was like

listening to the radio, listening to an audio book, placing a phone call by voice, writing email by voice, because you're driving, so they wanted you to -- instead of a text message by voice and email by voice, that's --

Right, that's what people do.

But the smartphones, you're not looking at your phone, right? But they did the cognitive distraction interview and they found writing an email or text by voice is among the most distracting things you can do while on the road. You might think you're staring at the road, but you're really not. So it just kind of illustrates my point. There's a lot more cognition that goes into this than one might think.

So I always kind of talk about that as a caveat for speech recognition.

But that being said, it allows me to do quite a bit with various options. Should have added -- I'm sorry, I referenced a track ball a few times earlier. That's an example of a track ball, relatively large ball, which I can use to control my mouse cursor, relatively large buttons that allow me to click. If people want to play with it a little later on, it will be up here.

So speech recognition, I listed out a few different things for -- what I will call independent speech recognition. What I mean by that is pretty much anybody in the room can come up and use the products I'm talking about. Pretty much anybody. This is speaker independent speech recognition. I did not do anything to train this. Pretty much anybody in the room can come up and start talking and it will more or less be about as accurate as what you're seeing here as it is with me.

It doesn't allow for novel vocabulary.

I'm going to guess I can't get this to recognize my middle name.

Don't know the background, but, hey, it's there.

Mostly network dependent, meaning it requires data to work. Again, if you're in one of the secure environments, I've had patients who couldn't allow the processing of their voice to be sent via the Internet to a remote computer for speech recognition.

Those are issues that you might be thinking about.

I find that they kind of allow for command and control. I should say voice control, and the Mac just got released a couple weeks ago and there's quite a bit you can do with that to control your computer or your iPhone. I've run into a few things I cannot.

I still have run into a few things I cannot do with my voice on iOS. If anybody wants to tell me how to drag an icon from one screen to another, I'm still looking. My patient wants to be able to do that and we can't do it with voice control thus far.

So the speaker dependent speech recognition like Dragon allows me to use correction strategies, allows me to use the novel vocabulary and stuff like that.

Once this is up and running...

Click minimize.

Dragon, where is my glasses?

I usually carry three pairs of glasses, one for my ID, one for the top of my head and one for my nose and then I usually find them.

Click cancel.

Click minimize.

Press F5.

Press F5.

Press F5.

So I'm going to cheat for a moment. Open Word 2016.

Click blank document.

Set the font to 28.

Sorry, I was cheating there because PowerPoint is giving me problems. Period.

I don't normally give a lecture or I don't routinely use Dragon with PowerPoint while I'm giving a lecture, period.

Delete "I don't normally give a lecture or."

Go to end.

But this allows me to pretty much do anything I need to do on the computer as well as type using my voice, period.

I will say I haven't done a couple of things that I probably should do, like adjusting the sound settings to this environment. I'm using a microphone, which means I'm getting auditory feedback. I'm in a much more echo-y room, period. But it's going to make a couple mistakes in that end, period.

Period.

Feel free to point that out a little more firmly next time.

Correct echo-y.

Correct...

Spell that. E-C-H-O-E-Y.

Move left two.

Backspace.

Choose one.

Go to end.

So I just added the novel word to my vocabulary. Which does not really exist, but I wanted to use it.

Period.

And that's something I'm able to do with Dragon that I cannot do with the network dependent, speaker independent packages, period.

Open Google Chrome.

Click maximize.

Click Gmail.

Press C.

Kimberly.

Press Enter key.

Go to subject.

Scratch that.

Press Tab key.

Hide there.

Press tab key.

I don't think Eddie wants to go to soccer, period. I mean, tomorrow night, by the way, period.

Press control-enter.

Welcome to my sordid domestic life.

But I can use Dragon to do anything on the computer pretty much that I want to do and relatively productively. I was being a little more facetious with that email than I might normally be.

I would really sit down and think about getting Wednesday night into my thing if I wasn't in front of you all and running out of time.

But those are options that I might consider using.

Very powerful. As I tried to point out, you're not going to do what I was just doing in a few days of training. It takes a while. And I've been using speech recognition since it started in the field in '99 and that took time to develop all of that. But it's an option.

All right, let's go back to PowerPoint and have it take over my lecture again.

Okay. Any quick questions on speech recognition?

Okay, cool.

Very briefly, we'll talk a little about brain control interface. You know, I had the mandate to talk a little about emerging, and this is what I would say is emerging technology. I wouldn't say it was something that is going to be helpful for competitive employment, but my clients with very severe disorders, we are trialing some different brain control interfaces that essentially allows a device to read lower level brain waves. It is not like read your mind or read your thought kind of brain control. It allows me to type relatively slowly. It requires relatively good vision. There are some options for auditory feedback. The big issue you'll find is that it's going to be relatively slow compared to everything I talked about. But for those patients or those people who need that for communication, that is pretty important. There was at least one case of a gentleman who developed ALS or Lou Gehrig's disease and had an advanced case and used a model of the P300 PCI that I have upstairs to continue to manage his lab in Pittsburgh. He was working remotely at that point. I'm sure there was a lot of support and I will tell you he was very slow responding to emails and such, but nonetheless he had a skill set and this technology allowed him to continue to participate in his employment.

So hopefully that is coming. A little bit more so.

I'm only briefly going to talk about switch access to the computer. Again, if I only am able to move that single switch, head, shoulder, something like that, more advanced switches or more lighter touch switches, I do have options that allow me to access my entire computer using just that motion. And those are options that we can get into.

You can use a process called scanning. Relatively low physical demand, obviously, but relatively high cognitive demand, and also a relatively high time demand.

I want to briefly talk about mounting. There are a lot of options. Here is my smartphone. If I'm using a wheelchair and I want to mount to my wheelchair, this is an option called modular hose. This will not work well on that particular arm rest but I have ones that will work better, and that allows me to use an option and speech recognition, for example... OK Google... send a text to my wife, love you very much, period.

>> Got it. Sending your message saying "love you very much."

>> EDWARD HITCHCOCK: Again, welcome to domestic life. But using that kind of mounting can often make it a lot easier for somebody to do stuff, right?

There are tablet mounts that allow me to hold my iPad or larger Android tablet or Surface tablets on a wheelchair or wherever else it is that I want. Stuff along those lines.

Very briefly going to talk about low vision and no vision. I try to make a point out for cortical involvement, I think in the rehab field we see issues with vision that are above and beyond the eyeball but more related how the brain is processing the vision called cortical involvement, and again gets radically overlooked, especially with some people with a neurological diagnosis.

But assuming there's no cortical involvement, obviously it's relatively easy to get into much more advanced options for magnification. Using a larger monitor can often be an option. Trying to inverse or modify the colors. Again, just to use my closed captioning device here, just having it be yellow font and black background is often a lot easier to see than the blue font on the white background. Apologies Shirley Ryan AbilityLab template.

Using auditory feedback for reading is often a good option for a lot of people. Especially if they do have low vision. Sometimes it's a lot easier to sit back and listen to the computer read something out loud versus trying to use my vision to process it.

If I do not have any vision, there are options like JAWS for Windows or a few other options that allow me to navigate completely using the keyboard and the mouse without seeing the monitor. I can use that auditory feedback to tell me what is going on in the computing environment. I am going to use that today when you guys couldn't see what I was looking at on my screen and the auditory feedback will tell me, Ed, you have to minimize your PowerPoint so they can see stuff. Not in so many words. But those options are there.

A lot of low vision users will also benefit from that auditory feedback. I know a number of people with low vision that would just prefer to use the stuff that is meant for people who are completely without vision just because it's easier. Especially when talking about the computing environment.

So those are all options that we can kind of talk about more or demonstrate. I am wondering if people have questions or things people would like me to talk about more extensively or see me do a little more.

Please... I think we're going to bring a microphone around, so...

Are you going to run it?

Great.

>> AUDIENCE MEMBER: Any chance you could redo the keyboards? You could do an example of using the keyboards again?

>> EDWARD HITCHCOCK: Using a keyboard?

>> AUDIENCE MEMBER: Using the keyboards you were showing.

>> EDWARD HITCHCOCK: With my eyes on the device or physical one?

>> AUDIENCE MEMBER: The physical one, yes, thank you.

>> EDWARD HITCHCOCK: The only one I happen to have down here is the big keys keyboard. If I plug that in with my USB connection... ever notice how you never get USB the right way up the first time? It's statistically impossible, I think.

This might take a second. So, yeah, at this point, assuming I'm using it on a table, the best example of this might be somebody with either a visual impairment, who is not able to touch type. If I give this to someone who can touch type they probably will toss it back to me. If they can touch type on a standard keyboard that becomes much easier. But if they have a low vision impairment or tremor, let's say I'm trying to type the H. I'm not typing anything because the Keyguard is preventing me right now. I can maybe plant my hand where it belongs and then bring my finger into the H and I should be able to type. I have a lot of people that will use support from the Keyguard itself to type that way.

Other questions or comments?

There's a microphone coming around.

>> AUDIENCE MEMBER: I just wanted to understand where you can purchase a one-handed keyboard.

>> EDWARD HITCHCOCK: I would suggest that you -- so right off the top of my head I would say a tap keyboard, T-A-P. It's one we have upstairs. I will say that most of the one-handed -- that's commercially available right now, a BAT keyboard B-A-T, is also available. They're both what are called chording keyboards. You type your five fingers in a variety of patterns. I don't begin to have them memorized, so I'm not going to get this right, but, for example, if I tap... I want to say it's my middle three fingers down, I will have produced an H. E is, I think, my one index finger. The tap keyboard is an A-E-I-O-U for my individual fingers. And then an N is my -- these two fingers together. A T is these two fingers together, and so on. Both of them require some training, obviously. I do want to... you know, I don't sell any products. I do kind of urge that people seek an assistive technology referral. You can actually try them in our department upstairs if you go through the referral process or you're obviously welcome to identify a referral somewhere else if you so desire. Basically I would suggest people do that before you just purchase them online, which is about the only way you can do it.

>> AUDIENCE MEMBER: What floor are you on?

>> EDWARD HITCHCOCK: The 19th floor.

>> AUDIENCE MEMBER: Thank you.

>> EDWARD HITCHCOCK: You're welcome. Other questions or comments?

Please, Jessica...

>> AUDIENCE MEMBER: We do have employers in the room, and how does Shirley Ryan Tech help with employers in general?

>> EDWARD HITCHCOCK: Depending on what the funding is we will go out to an employment place and try to take a look at the environment there. More commonly we try to have people come to see us. Again, it kind of goes through the process of what I was just talking about. I need to know what the client wants to do for their job. Presumably they have vocational goals. And it was mentioned a few times, that kind of takes us into a higher level of needing to use this stuff to really make people efficient as possible.

But we can have them trial the equipment while they're with us. Do some to have basic training to at least get people to a functionally adequate point of view if not perfection, and then have them take it on some work tasks as much as possible. I would really suggest again the same thing of just going through the process of getting a referral, which just simply starts with a doctor's order. Then we can hash out having people

come in, evaluate what the options might be and then really have patients or clients trial the options in the environment that we're in. Then we go from there.

Thank you.

Question over there?

>> AUDIENCE MEMBER: With a doctor's order, would you be able to get coverage for a vocational --

>> EDWARD HITCHCOCK: Yeah, we get coverage from a few different places. We will take health insurance if they will cover it. Some health insurance covers vocational issues. Some do not. But there's a slightly different restriction in terms of kind of -- I hate to say "teach to the test," but we have to teach to the point of view of medical necessity versus vocational issues, depending on the insurance. But we do take medical insurance for really the vast -- for most of our clients. But we also will talk about setting up private pay arrangements with an employer or what have you.

Other questions or comments?

We do favor a team approach at Shirley Ryan, so if there are compliments and affirmation, I will take those. Complaints should be directed to Deb Crown. And, yeah, I think at this point I will -- thank you guys for coming. I think my email is in the PowerPoint, so if anybody has further follow-up or what have you, please let me know.

Thank you.

[Applause]