

## A Students Perspective – Considering Students on the Autism Spectrum Video Transcript

-: My name is Ainsley Latour. I'm one of the co-founders of IDEA-STEM and the purpose of this video is to introduce the session around working with students with autism or autism spectrum disorders in the STEM classroom.

So before we get started, I'm just going to get a little bit of a description of what's on the screen. That is myself sitting in my home office. There is a brown wall behind me and a whiteboard. There's no markings on the whiteboard and there's also a white door behind me. I am a female in my 30s. My pronouns are she/her and I'm wearing a black jacket with a black blouse and there's some light colored markings on the blouse.

My hair is light brown and I am wearing it down. So the session that you're about to see around making STEM accessible to students with autism or autism spectrum disorders, it's gonna be a conversation between myself and recent University of Toronto science graduate, Jennifer Sinclair.

Now, Jennifer is a student who identifies not only with autism or as autistic but she also identifies with chronic pain and you can find out more about her and all of our speakers in the posted biographies within the conference portal.

So students with autism spectrum may experience a variety of challenges and barriers in their learning within STEM fields. This session is going to introduce some of the challenges that students with autism experience in the science classroom and also several suggestions about how to accommodate students who are autistic or on the autism spectrum in the classroom.

We talk about accommodations, both for face-to-face learning and also in the virtual environment. We know that one of the biggest challenges for many students with disabilities not just autism or who identify as neuro diverse but also students with learning disabilities, vision and hearing loss as well because of the lack of access they have to social information is of course some difficulties with social skills.

So we also talk very specifically about the social skills that students may need some extra guidance to develop in the science classroom. And there's a handout in the conference portal as well that goes with this session and it has a lot of great information so we just invite you to check that out and of course, any feedback you have on the session or the handout is welcomed.

One thing that I'd like to leave you with is often students with disabilities, especially autism may have a variety of different barriers and there's no way we can sort of generalize into all students with autism may experience A, B or C. So I just really wanna encourage you to really get to know the student and find out what barriers they have rather than going from their diagnosis alone.

And of course, as teachers, you're all well aware of that. And then the other comment to have is about the language. So in this session, I use a variety of language to refer to students who are autistic or have autistic tendencies or are on the autism spectrum.

And the language that you use should be whatever language the individual wants you to use. There are people that prefer person first language and generally that seems to be politically accepted but there are students who prefer non-person first language. So to be identified as an autistic person and some of that, well it's a larger discussion. We don't have time to get into here is because they feel they can't separate themselves from their diagnosis, it's really impacted who they are.

So if you have comments or questions, we invite you to submit them into the general conference email or you can contact myself or Jennifer and we'd be more than happy to speak with you.

Thank you.

-: Hello everyone. My name is Ainsley Latour and I'm here with Jennifer Sinclair and we're gonna have a little bit of a conversation this morning around the student, experience of students with autism in the science classroom.

And before we do that, I just wanna take a few minutes and introduce ourselves a little bit. So once again, my name is Ainsley. I am one of the co-founders of IDEA-STEM and we are co-hosting this conference with the University of Toronto.

I am a female in my late 30s, I'm white. I have light brown hair that's tied back into a ponytail and I'm wearing dark rimmed glasses that are slightly tinted with a pink hue. My pronouns are she/her and I'm sitting in my home office with a whiteboard behind me which has nothing written on it and the wall is brown.

So I'm gonna turn it over to Jennifer to introduce herself and then we will continue with our learning.

Great, thanks Ainsley. My name is Jennifer. I am a white female. I use she/her pronouns. I have long blonde hair, which is longer than it usually has been due to lack of haircuts from the pandemic. I am wearing a white sweater. I have a pale colored wall behind me and as well as some shelving units and a mesh net which contain a collection of stuffed animals.

Regarding my academic experience, I have a B.A. in English from the University of Toronto and I also have a Bachelor of Science in conservation biology, also from University of Toronto.

Regarding my lived experience. I am a person on the autism spectrum and I also have mental health disabilities which are co-occurring with that and I also identify as a person with a chronic pain disability.

So I hope what I have to say here will be informative.

-: I'm sure that it will be Jennifer. Thank you so much for introducing ourselves to our listeners this morning. I also wanna make a note that there are no PowerPoint slides being used with this presentation. It is completely auditory and so for those folks who may not have full access to vision, I just thought I'd let you know that.

So we'll jump right into our questions and the first one is I would like you Jennifer to describe some of the main challenges or barriers for students who identify as autistic or as a person with autism in the science classroom.

-: Sure, well, one of the first things that comes to mind is related to an issue of space. Some labs have many students in them and not necessarily a lot of space due to things like lab benches being in the way. So this can be an issue for people who find it hard to be in crowds which is an issue for some people on the spectrum, as well as some people with, for example, anxiety disorders or PTSD

and it may also affect students with mobility disabilities as well in terms of their ability to navigate around the classroom and also another space related issue comes when certain equipment has to be shared and sometimes it creates a sort of traffic jam or bottleneck around the equipment, which can make people nervous if they're standing in a group of people and it can also present challenges in terms of some people needing extra time to mentally process what has to be done or to physically set up equipment, which affects students with a range of different disabilities

and it sort of becomes an issue when you know you need to get your work done so somebody else can use the equipment and it becomes a source of stress when you feel like you need to rush.

And time also relates to the issues of planning and sequencing an experiment. Some people have executive functioning issues that can make planning and sequencing challenging and also executive functioning issues can impact switching tasks from one part of an experiment to another.

You sort of have to multitask sometimes when you only have a set amount of lab time and a number of tasks that must be done. So time can be an issue that way as well.

And time can be an issue also when there are in-class lab write-ups that need to be done or sometimes there might be an answer sheet that you need to answer questions on.

Some students on the spectrum might have motor skills issues that affect their ability to produce a written content.

They might be processing slower or they might produce the written content more slowly and this could also affect students with mobility disabilities too of course.

And in biology labs in particular, sometimes you're asked to reproduce a drawing of what you see under a microscope and I know I certainly found that challenging. I was not good at it all throughout high school and it took several years in university for me to really get the hang of it.

So that can be an issue, just ideas of time and space.

And also another thing to be mentioned is sensory issues. There are certain pieces of lab equipment that can make sounds that are either loud or just kind of odd, like in some earth science labs, they have kind of a rock shaker machine that separates out rocks and dirt into particles of various sizes and I can tell you from experience that that is incredibly loud and also sometimes fume hoods can make noises as well.

So these can either distract from any instruction or discussion that may be taking place or they can potentially cause emotions such as anxiety.

I know that being near the rock shaker machine caused me to be incredibly anxious due to the noise even though I could clearly see where the noise was coming from, it was still a challenge.

And other sensory issues can relate to having to wear rubber gloves in labs or to chemical odors, which could be in a chemistry lab or potentially in a biology lab if you're doing a dissection, the chemicals used to preserve the specimen for dissecting don't generally smell very good.

And so moving on from sensory issues, I want to sort of touch on social issues and participation and one thing is that verbal participation such as answering an instructors questions, that can be difficult for students on the spectrum that are anxious in social situations and also a lot of people are anxious in social situations in terms of answering teachers questions in a group of their peers anyway, but for people on the spectrum in particular things like knowing when to enter into a conversation can be hard and sometimes initiating speech in itself can be difficult, which may be related to anxiety or that may also be related to motor issues as well regarding speech production and also group work can be kind of difficult.

There may be anxiety issues at play or other social challenges and also sometimes other students are just uncertain about how to interact with a student who may be on the spectrum or have any other type of disability.

So sometimes students, for example who communicate non-verbally, they don't necessarily have their skills recognized by other group members who might not really know how to interact with them and don't fully realize their abilities.

And unfortunately one thing that sometimes happens, it has happened to me is that finding a group or partner to work with can be hard and when you do find somebody, you may not necessarily be aware that they have chosen to partner with you because they've realized that you generally know a lot of answers and sometimes there are unfortunately some students who can coerce one of their peers into doing most of the work for them.

I've been in that situation several times. So that can be a challenge as well just navigating classroom dynamics in terms of social things.

-: Okay, great.

That was an excellent overview of many different areas of challenge for students with autism or students with many other types of disabilities as well.

Thank you so much for being vulnerable and honest and sharing your experience and your knowledge with us around those barriers.

So you mentioned just to recap quickly, executive functioning skills, fine motor skills can affect handwriting but also setting up of lab equipment, navigating space issues especially if there's a lot of tight space either where you're performing the experiment or where you're trying to access equipment.

You mentioned loud noises or noises that are unfamiliar or somehow irritating for different people.

So I also wonder whether the noise level of students working in groups could also irritate some people and cause anxiety and stress.

And you mentioned difficulty around the anxiety produced by having a time limit, either to get stuff done in class or to perform an experiment or to make equipment available for somebody else or different things like that.

So that was very comprehensive, thank you.

-: You're welcome.

-: And so I just wanna touch briefly on anxiety and I know there seems to be many different sources of anxiety for students in the science lab who may have sensory sensitivities to sound or light or how something feels or the space around them and definitely with time limits and the anxiety of working in groups and stuff, it sounds like mental health can be a challenge as well for students on the autism spectrum and I'm really glad that you shared that.

I think, we'll talk a little bit more about that later.

So I'm interested to know what pieces of assistive technology have you Jennifer used throughout your education, focusing in on high school and sort of your early undergraduate years that have really facilitated your learning in the science classroom

-: Myself, I haven't used a whole lot of assistive technology that may be lab related but I do have some ideas which could be beneficial for students on the spectrum or students with other disabilities as well.

So mentioning the motor skills things, even a basic computer and printer might be useful to have in a classroom for students to be able to type their in-class assignments and lab reports to hand in. That way they don't have to struggle with the handwriting aspect when they know the material perfectly well, they just need different means of sharing it so it can be marked.

And since a lot of people these days, basically everybody has a smartphone. A lot of these phones do come with either built in or readily downloadable text-to-speech capability.

So I know there are a lot of different rules around technology and phones in particular in classrooms but for accessibility reasons, it may be reasonable to allow students to use their own phones with this text to speech capability to do their presentations if they have difficulty due to either extreme anxiety or to speech production issues from a variety of disabilities to do the presentation, it's still their own idea, their own thinking, it's just being said by a different voice and it could also facilitate asking questions in class.

So students can more readily engage with the material if they have difficulty speaking out loud and personal phones generally have cameras and so it would be great to be able to allow students to use those cameras to take pictures of any diagrams that might be done on blackboards or whiteboards.

So this can be used as a visual to support any written notes that they might have. It may be a lot simpler for a lot of people to be able to do that than to try to copy down the diagram themselves.

And I think the final thing I have to say about that is regarding take-home lab reports or assignments, sometimes it would probably be useful for a lot of people for a teacher to help students break that assignment down into separate pieces to each be done and then you can use a task management app to stay on track with each of those separate tasks.

I've used the free version of something called Habitica. So that's a gamified task management app. You can either get the free version or the paid version that has some additional features in it. It's available for both Android and iPad and basically, like I said, it's gamified and you can earn and level up sort of virtual animals or virtual creatures to have as your companions.

So I've found that useful for a variety of things, not just academic.

So looking into the various task management apps and finding one that works for each individual might be a good idea as well.

-: Okay, great.

Once again, those are some fabulous ideas and they're inexpensive ideas, they're ideas that high school teachers can readily use that are freely available and of course many students do have access to smartphones or tablets so that really facilitates what's available to the students now versus even a decade ago.

Thank you for sharing that.

So the next question I have or the next topic I'd like to talk about is around social skill development. We know that students who identify as autistic or as a student with autism sometimes can have some difficulty around social skills and this is not limited to students with an autism diagnosis, it could be students who have hearing loss or vision loss or a learning disability, many other types of disabilities also create the need to teach social skills very explicitly.

So I know that for students who are on the spectrum, they may have trouble interrupting conversations, knowing how or when to interrupt a conversation, they may have trouble keeping up and participating in a conversation because it may take them time to think about, oh my goodness, do I wanna say anything and think about what they wanna say and just process what has been said especially if there's an auditory processing issue which often there can be.

And the other students may not be aware of or patient to give the students the processing time they need and so inadvertently that student ends up getting left out of the conversation just because they're not given enough think time. What are some of the ways you think high school students could or high school teachers can support the teaching of social skills and the inclusion of students with autism socially in the classroom?

-: Sure, well, I think it probably starts with the creation of in general, what would be a respectful classroom environment? So on the first day of class teachers can use the first part of that session to work collaboratively with all the students to sort of co-create a specific list of ways to

work effectively and respectfully in the classroom and when that list has been compiled then it can be posted in a prominent place in the classroom and also in any online portals that students can access.

So if everybody knows what the expectations are and the expectations are made clear from the first day, that can help. And I think for people on the spectrum in general, the social skills development can be facilitated if other people around them that may not be on the spectrum are just understanding and patient and respectful of diversity.

So creating an environment where it's explicit that all kinds of diversity are welcome and should be not just tolerated but celebrated and figuring out ways to work collaboratively with someone, even though they may be different from you in some way.

Just starting from that viewpoint as a jumping off place and then starting to make it more concrete when in discussions with the student that can probably help. And also just the idea of what we mean by social skills, making that concrete.

For example, the ideas of basic respect need to sort of be separated out from things that we may consciously or unconsciously want people to do just because they're considered quote, unquote normal.

So for example, the idea of learning to take turns with a piece of lab equipment, where there may only be one piece, you can explicitly say, since this is the only piece of this equipment we have, I do have to ask that when you're finished using it, then you move out of the way so that another person can access it, so everybody can get their work done and contrast that to something like eye contact, which a lot of people on the spectrum aren't necessarily good at. It can be quite uncomfortable and actually a lot of us, including myself can process better what is being said if we're not necessarily making that eye contact.

So just the idea of social skills. What's normal I guess, quote, unquote normal is not necessarily what we have to strive for, we just have to strive for respect.

-: Makes sense.

Thank you for giving us some concrete examples. I really liked the example about, specifically describing the behavior around eye contact or no eye contact and describing the behavior around what to do when you're finished with piece of a lab equipment, well, move out of the way physically so that someone else can come and use and access that piece of equipment.

Do you think Jennifer, that it would be helpful for teachers to establish a minimum amount of wait time that students should allow each other to have before they respond to someone? So if you are working in a group, in a lab and you ask a question about what someone is seeing down a microscope or how to attach a burette apparatus or how to put a burette apparatus together.



Maybe as a teacher, you're gonna set an expectation of wait 30 seconds or a minute for somebody to respond and that can feel really uncomfortable, I would think to just sit there for a student who does process very quickly to wait for someone else to respond but in making that an expectation then it makes it a natural part of the respectful culture of the classroom to give those students who may need it a little bit of time for extra processing and therefore be able to participate a bit better.

So do you think that identifying a minimum amount of wait time too would be helpful?

-: I would say it might have to depend on the classroom. That seems like a very individual thing to me but just going back to the idea of respect and inclusion of all different kinds of diversity, maybe one of the things that could be mentioned in a very general discussion when you're introducing this with the students is just to introduce the idea of processing time, that our brains all work differently.

So just let people know, for example, if you ask a question and the other person doesn't respond right away, try giving them a minute just to think about what you've said so that they can respond with an answer that's going to be the most useful and I think just that general idea, students can sort of adapt as time goes and they become more comfortable with their classmates.

People will generally be able to figure it out but certainly saying something like, if you're not sure then say count mentally to 20 or something like that, giving that as a guideline could certainly be useful at the start of classes.

-: Right until the teacher and the students are able to develop the social culture of the classroom and the social norms.

Okay, excellent.

One of the things that also comes to my mind as I was listening to you was just the creation of a see, hear, do chart. So what respect looks like, what you'll see in the classroom, what you hear in the classroom and the behaviors you would see associated with those if they can't be seen or heard.

So how people walk around and sort of what their bodies might look like in a room where there is a lot of respect going on.

Okay, thank you.

I think right now, as you're aware, the world is in a very unprecedented time with the COVID pandemic that is currently going on and sometimes teachers are having to teach virtually or

they're not being able to interact in quite the same way, even face-to-face as previously we've been able to interact with each other.

What are some of strategies for teachers to use to better engage their students with autism or autism spectrum disorders in a virtual environment?

-: I guess we can think about it in two ways in terms of what barriers might there be and how do we sort of get past these barriers?

So if we start with what the barriers are. I was discussing this with some other people on the spectrum and some people have had issues with various instructors not allowing the chat function to be used to ask questions and requiring people to speak out loud and so this of course makes it hard for people who have difficulty with speech to actually answer the question and show that they do understand the classroom topic.

And some instructors also haven't turned on captioning for videos that are being shown educationally.

So that can affect a wide variety of students, autism specific, it may be auditory processing issues and sometimes background noise from other people's workspaces can also be a challenge.

So certainly taking down those barriers would involve things like, allow that chat function to be used to ask questions, certainly make sure that the videos you're going to show have captioning capability and do turn on the captions and some videos it may be possible that they come with transcripts and if it's possible to provide those transcripts probably through an online portal, for example to the students, some students can take in information better if they read it.

I'm one of those people and I found transcripts to be really helpful especially for times when I am sound sensitive and I can't necessarily actually listen to a video but I still want the information. So if I'm able to read the transcript, that is much easier for me and also just to cut down on background noise.

Groups that are maybe having a group discussion over a platform such as Zoom or whatever, just a general encouragement to the entire class to help everybody to try to minimize sources of background noise where possible.

That may not be possible if for example you live next to a really busy road with a lot of traffic, you might not be able to do much about it but if it's coming from somewhere in your home, it may be possible to close a door or something to at least minimize some of that background noise.

Swinging back to the chat function for a second. That's good, but it can also be a distraction for a lot of students, including students who are neuro-diverse. So it's maybe a good idea to check in with the class periodically just to help everybody stay on track.

And another thing that came up from another person on the spectrum was that it can be hard to remember if you're on mute or not and sometimes software and computers don't always necessarily clearly show this. So a reminder at the beginning of the course to regularly check whether you're on mute or not may be good for all students.

And another thing that has been happening is that everybody has been having to get used to new technology and software and this can be anxiety provoking for a whole lot of people especially students with various mental health disabilities or who are on the autism spectrum and may already be prone to anxiety or to be uncertain in new situations and there's some software that has been used for tests and exams and unfortunately it doesn't let students go back and either review their answers or change or add more to their answers.

So this can definitely be a problem for everybody in the class, I would say.

So trying to pick a platform specifically for testing exams that students recheck their answers or improve their answers is going to be really useful and also when you're using a new platform, finding tip sheets, some of which may already be readily available online and linking to those tip sheets so that students can read that information ahead of time and also allow me access to the learning platform before any assignments have to be done or any real class work to be done, which gives students the opportunity to, I guess you could say test drive it, especially for the test exams software and for any virtual simulations that might be being used that students may have to do an assignment on.

It reduces anxiety and if there is a problem, you can take care of doing the troubleshooting then instead of having it crop up during an important assignment. Can't always guarantee anything with technology but that may potentially help.

And also putting lectures online that can be viewed after class and viewed multiple times. It can help students with many different disability types take notes at their own pace and allow for breaks as people need them at their own pace to either improve focus if they need to take care of personal support needs such as taking medication and it lets students who may have various health challenges that have affected their ability to watch the lecture in real time to catch up.

With my chronic pain disability, I tend to have a lot of pain in the mornings on the worst days and if I had a lecture at say 11:00 AM, there's no possible way I'd be able to make it because I would either be asleep from the painkillers or curled up crying because of the extent of the pain but if I knew I had the option that the lecture will still be there tomorrow then I can take the day to reduce the pain and rest because it's really exhausting to be in that amount of pain and then I would worry less about being able to get my schoolwork done.

-: That was a lot of really vulnerable honesty again that you have provided so thank you so much for being honest and really being specific and talking about what it's like to have a chronic pain diagnosis and also to struggle with mental health and anxiety on top of autism.

Definitely it sounds like flexibility is key with online learning in terms of being able to provide students with the option of watching things at a later date or watching them again or to engage with captions or not to engage in captions, to use the chat function or to not use a chat function.

Obviously everyone is unique and it seems like the most important thing for teachers is to really build a respectful environment with a lot of trust and vulnerability with their students so that individual students can tell those teachers and have conversations with them about what works best for them because there's no generalizing, everyone is different

-: For sure, there's no specific formula.

-: And I could, I definitely appreciate that with folks who struggle with mental health or chronic pain and have to miss school almost have their condition exasperated with the anxiety that comes from missing school and how hard it is for those individuals to catch up on something that's missed.

So it strikes me too, that if people are able, teachers are able to provide alternative ways of catching up or allow increased timelines or various other ways of flexibility then they'll really facilitate the student's healing so that they can get back to learning as quickly and efficiently as possible.

-: For sure.

-: Okay, great.

A couple of other ideas came to me just overall as you were speaking about the assistive technology piece and I wonder if allowing students to have white noise in their ears would help some of them if silence is an issue or if having students have noise canceling headphones or just listening breaks where there's another room available where they can just go for a couple of minutes or go for a walk and get a drink just to relieve some of that sensory overload they might get during a really noisy lab.

It might be really helpful for them as well.

Do you have any comments before we finish?

-: I definitely agree that being able to just go for a walk and get out of the noisy environment would be very useful.

I've had to do that actually myself and it was a workplace situation and honestly it was so overwhelming I wanted to hide under the desk.

Not that that would have done much good and I couldn't fit under the desk anyway, but so, yes definitely having the flexibility to say it's okay to go for a walk for a couple of minutes to get away from this noise. If that's at all possible, I would definitely encourage that and certainly for certain noisy situations such as the rock shaking machine I was mentioning earlier.

Now we did have earplugs, (indistinct) more or less effective depending on the individual student but definitely either providing inexpensive ear protection, either the disposable earplugs or something like might be found in a construction site that can be wiped down with a sanitizing wipe after or encouraging students to bring their own if you know that a certain day is going to involve noisy equipment, that would absolutely be a good thing, I would think.

-: Sure, okay.

Thank you Jennifer.

And just a final note. So I'm a teacher myself by training and I think it's important to mention that time constraints and having to perform an experiment or do an assignment

within a certain allotted period of time, especially if it's in class and the student can't take breaks is a big stress for a lot of students, whether they have a mental health disability or an autism spectrum diagnosis or whatever the case may be.

And I think there are obviously some experiments that need to be performed in a prescribed manner within a certain amount of time because the science won't sort of give the desired results or allow the students to observe the desired results if the student does take break.

However, if the expectation is that the student is not required to do something in a prescribed amount of time and the experiment doesn't need to be done in a certain amount of time it certainly seems like people, teachers should be planning to give students break times when they need it and when they're doing assessment and evaluation practices to keep in mind that if they are doing a timed exam or a timed test, there needs to be clear reasons for that and they need to be written into the curriculum or the core expectations of the course that a student must be able to perform X, Y and Z in X amount of time because

if that's not the case, then students should be allowed to use whatever time they need with whatever breaks to demonstrate their learning of a concept.

So thank you Jennifer for your time today. We certainly appreciate you sharing your experiences with everyone who's here and I guess that's it.

So I'm just gonna stop the recording.