

American Chemical Society AMA: I am Karl Booksh, a professor of chemistry and biochemistry at the University of Delaware. Ask me anything about getting more opportunities for people with disabilities into STEM careers!

AmerChemSocietyAMA¹ and r/Science AMAs¹

¹Affiliation not available

April 17, 2023

Abstract

Hi Reddit! Karl here. I am a professor of Chemistry and Biochemistry at the University of Delaware. I have a successful research group with over 100 publications and 5 patents on the design and application of chemical sensors. I'm a Fellow of the American Chemical Society and Fellow of the Society for Applied Spectroscopy. I broke my neck BASE jumping in the Grand Canyon during Spring Break my freshman year of college. OK, really it was playing flag football, but I'm working on a much sexier legend. I've been active in promoting inclusion of underrepresented groups, especially persons with disabilities in STEM for the past 15 years. I've chaired the ACS Committee on Chemists with Disabilities and am current chair of the ACS Diversity and Inclusion Advisory Board. I'm also Principal Investigator on a newly renewed NSF research experience for undergraduates (REU) grant to get research experience for students with disabilities interested in advanced STEM degrees. <http://sites.udel.edu/seli-ud/> People with disabilities (PWD) continue to be a greatly underrepresented group in Science Technology, Engineering and Mathematics (STEM). PWD comprise 7% of the population between 16 and 21 (US Census) and 8.6% of the total school population participates in the Individuals with Disabilities Education Act (IDEA). Students with disabilities express interest in STEM at the same rate as students without disabilities. Approximately 20% of graduating high school seniors and ~20% of graduating college seniors wish to continue towards a higher degree in STEM. However, less than 2% of STEM doctoral degrees earned by US citizens or permanent residents are awarded to students who identify as having a disability! Remove soft sciences from the equation and the rate drops to 1%. Amazingly there has been no improvement in PWD doctoral students since the passage of the Americans with Disabilities Act (ADA) in 1991: there is no statistical increase in the percentage of earned STEM doctoral degrees by PWD among US citizens or permanent residents at US institutions (see this figure <http://i.imgur.com/3LPJMjN.png>). Factor in foreign national students to get the statistics on all STEM doctoral degrees awarded by US institutions and the trend becomes negative improvement. Across the same time frame, the percentage of STEM doctoral degrees earned by African American and Hispanic students each increased by 0.16 or 0.17 percentage points per year on average. Federal support and interest in the outcome may well be a factor. The 2010 Federal STEM Education Inventory Data Set on broadening participation (data.gov) shows \$397.8M dedicated to 'Institutional Capacity' or 'Postsecondary STEM' with \$378.3M earmarked for underrepresented minorities and only \$19.6M dedicated to students with disabilities. This is a 19:1 ratio! I will be back at 1 pm ET, Ask me anything about getting more opportunities in STEM research and careers for people with disabilities! Hi All! I'm on live now. I'll probably stay live a bit past 2:00 pm EST. I type slowly. /ksb I'll drop back in later tonight after my kids go to bed to get to the rest of the great questions. /ksb There is a couple of questions that I haven't gotten to. I'll try to hit those tomorrow, but I have a proposal that I need to wrap up in the next 24 hours. /ksb

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AMERCHEMSOCIETYAMA [R/SCIENCE](#)

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Greetings, Professor!

I teach at a major university, SE US, Chemical Engineering. One of my students broke his neck in the spring, and is (at least in the short term) confined to a wheelchair.

The young man is a good student and has fair promise and drive for the field, but I am very concerned that his new situation will prevent him from finishing his studies and taking full advantage of his opportunity.

What are the best things I can do to help support him in this difficult time? Are there grant programs that he might be able to make use of? What can I do to help him get back to school and keep moving forward? What timeframe for guys recovery and return to college do you think is realistic? Do you think that he will be able to earn an opportunity to practice engineering in the field if he is permanently confined to a wheelchair?

Any personal experience or published studies that would help me to understand and mentor him would be very appreciated. I thank you in advance for all your hard work in the area.

[StGeorgesArmy](#)

First, my sympathies to your student. It is a rough transition to make. Especially when one is of the age where they feel invulnerable.

You ask many good questions. And I had the same concerns when I broke my neck the day before finals of my freshman year of college. Let me touch on a few points. Looking at the questions submitted, people are asking parts and pieces of your questions and I'd like to go into more details with them to keep the treads focused.

Success: I'll hit this question first because the rest are predicated on the answer here. Yes, he can succeed. The chair of Electrical Engineering at UD is quadriplegic without use in all for limbs. Focus on what he can do now. As he becomes more accustomed to using a wheelchair, his abilities to expand activities will increase. There are a million things one can do in life or even in Engineering. Maybe now he can't do 500,000 of them. But there was only time to do 100 anyway. So he can't climb a cooling tower or maybe bench chemistry is impractical. But CAD design, modeling, data analysis are should all be accessible to him.

Support: For me, the best support came from friends and faculty that let me know nothing changed in our relationship. Yes, everything changed in my life and I had to reimagine my interactions with the world. But people around me still had the same expectations of core values. A bit of patience might be needed as he feels his way in the world. I was told that acquiring a disability does not change ones personality, it magnifies it. People with a positive outlook become INSPIRATIONAL!. People who are generally negative are seen as bitter. I would also remind him to keep his focus on accomplishing things that are important to him.

Return: I think the timeframe for a return to studies depends on how the student physically and emotionally responds to the injury. He might want to start slow. Maybe take one class at a local college as soon as he can to get a feel for needed accommodations and how to interact with the environment. Medications may need to be titrated to balance effectiveness vs. side effects.

Keeping him moving forward: Focus on what he can do. Think of solutions more than problems. Be open minded about curricula – adapt for what matters vs. what has traditionally be done. Resources: NSF and NIH have supplemental grants for people with disabilities in the lab. The State DVR should help too. The American Chemical Society Committee on Chemistry with Disabilities can offer real time thoughts and suggestions. We have a slightly out of date Handbook on Teaching Chemistry to

Students with Disabilities that may offer advice and encouragement.

<https://www.acs.org/content/dam/acsorg/education/publications/teaching-chemistry-to-students-with-disabilities.pdf> And feel free to email or call me if I can help.

What is being done so far for the inclusion of those with invisible disabilities in STEM research? As a graduate student with several chronic illnesses, I look fine but have to spend a lot of time away from the bench for doctor appointments and extreme illness. My output of research will not be as much as my peers and I cannot just "work harder" to "publish or perish" in order to catch up. Is there a way to be mindful of the structure of graduate school and STEM research to allow for inclusion of differently abled students, researchers, and faculty?

[chronic in cali](#)

I dreaded this question because I knew it would be coming and I've never come up with a response that was satisfactory to me. There are at least two issues knotted up here: (1) work-life balance and (2) acceptance and accommodations. What you bring up is a problem for all people with disabilities. The physical and social structures in place mean we have to work harder and that tilts to work-life balance towards 'work'. The trick is to find the right environment that is inherently accommodating. I was lucky that my research advisor and the University of Washington were very supportive, focusing on my abilities, not the physical disability. Try to find a place that is flexible in how you work and what you do. Maybe there are ways to significantly contribute without being at the bench 9 – 5. I've seen groups that eat their young and kill the slow or infirm. Unfortunately, these groups are often successful, in the short term, by bean counting metrics that administrators and reviewers love. But research is showing that diverse and accommodating organizations have greater long term successes. I think the world is slowly coming around to that philosophy.

Disclosure and negotiation for accommodations are critical. If you are in a supportive environment, that is the way to make the balance work. But if you are in a hostile or non-supportive environment..... I don't know. Try to move? There is no good answer that I know.

The part I hate saying, but really applies to everybody with and without disabilities, is that we need to temper how far we want to go in a career with how much we want a quality home life. I've yet to find an adequate answer even for myself there.

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Thanks. Didn't know about the archiving feature and referencing feature.

Hello Professor,

Woman about to pursue PhD in STEM here. Are PWD STEM undergraduate degrees showing this lack of growth as well? Are PWD not pursuing doctorates in STEM or is the issue with retention within these programs? What are things that can be done at the undergraduate level to provide support for SWD and potentially increase STEM (and hopefully doctoral) degree retention?

When attempting to increase retention of under-represented groups, support seems to be geared for increased involvement. Is there a better way to increase SWD involvement specifically? Are there accommodations that can be made to increase SWD participation/interest? I don't think I've ever even *seen* a research lab that would be comfortable for someone in a wheelchair. Many university labs I've seen are packed full with tight corners and high lab benches. If you don't mind sharing, how have you dealt with that personally as a chemist?

Thank you for the AMA. This isn't something I'd ever known about and will be keeping in mind as I pursue my own career in STEM.

[elatele](#)

The problem is retention. Interest in STEM PhDs are the same for BS grads with and without disabilities.

I was in a workshop years ago I mentioned lack of pwd in chemistry to a table of department chairs. They did bring up the cramped disorganized labs. I countered with, honestly, if the lab is that bad it is a safety hazard for all occupants. Newer labs are more wheelchair accommodating. So accessibility is becoming less of an issue.

I dealt with accommodations by beginning my career in data analysis then switching to sensors and spectroscopy once I was a postdoc and faculty member; I would conceive the experimental plan and graduate students would execute. I did get blowback during my faculty search about my inability to personally do bench chemistry. I pointed out that the most successful faculty rarely do their own experiments. I still spend time in the lab with my students, but I find the learn more because they do the manipulations.

I'm trying to change the philosophy of accommodations. We spend so much effort on accommodations to perform certain gatekeeping actions - e.g. how to get a blind student to do a titration? The proper accommodation is to consider what needs to be learned for the students success in chemistry. Is the physical manipulation of performing a titration essential? Could there be other ways to learn quantitative equilibrium chemistry? And, honestly, must EVERY student master some version of wet chem when there are so many equally (or more) important chemistry concepts not covered in the curriculum.

Hello professor,

What you think of those who have mental disabilities (of all degrees of severity such as mild dyslexia to something more serious) participating in stem fields. I ask because, for the most part, stem subjects are known to be mentally rigorous. Yet at the same time there are many students who not only like the field but can succeed in it given that they have the proper motivation and help.

I find the question difficult because on one hand, at certain level people must be treated like adults and they cannot be coddled into a program they cannot handle themselves. Yet on the other, cutting these people off deprives those fields of a significant source of talent. That is, assuming with the proper help such individuals would be able to excel.

In essence, should we be precluding a significant portion of the student population from the stem fields based on their perceived intelligence or results in those subjects without aid.

[Flagellum Dei](#)

Good question. The key is to determine what degree requirements are essential and what requirements are arbitrary and convenient. Take dyslexia or other processing orders. These have nothing to do with ones innate intelligence, creativity, or ability to contribute. They are related to the

arbitrary modes that we chose to convey and archive information as a society. Best student in my REU program had a hard time reading due to a processing disorder. Therefore he had difficulty passing many reading intensive classes. However he excelled at organic chemistry theory and application. Why? The information is presented pictorially. The organization Learning Allies translates books to tape. They used to work just with the blind. But they realized many students have reading disorders where they learn much faster if they see and hear the material simultaneously. So we need to ask the questions: Why can a given person handle a program? Is it due to arbitrary programmatic constraints? Or is it due to innate ability?

Now, I struggle with the next question... What do you do for someone who has the innate ability but has been failed by the system for so long that they are behind their peer group. What is a 'reasonable' amount of accommodations to get them up to their natural level if we hadn't failed them?

Not a question, but when I was in school my friend pointed out that the only stair-free way to enter the brand new engineering building was by going around back and taking the loading dock lift. I imagine that its not only the inconvenience but a feeling of isolation that is a problem to students with physical disabilities.

[shatterSquish](#)

Great observation. As a student I hated having to leave the group to use an alternative entrance. This is also an issue with separate facilities for ADA testing accommodations. There is a lot of advantages to being with your peer group right before a test or class. Both educationally and socially.

Hi Karl!

Former ASU student of yours here. What are your thoughts on university provided assistants for students with disabilities in undergraduate lab courses? For example, I have had students enrolled in Gen Chem who have lost the use of one or both of their arms. The lecture is obviously not a problem, but the university provides an assistant for them in the lab who tends to end up performing all of the lab exercises while the student is supposed to direct, observe, and record data. Ultimately, my impression is that these PWD students do not have a very fulfilling experience, and in some cases only arrive at the conclusion that they have no future in chemistry. I can't help but think that there must be a more effective way to construct labs for these students, especially for those not simply filling a requirement but who intend to pursue a career in the field.

[waywardminer](#)

Hi! Send me an email, I'd love to hear how you are doing! This hits on my perpetual rant against the focus on physical accommodations verses a flexible curriculum. We need accommodations because the curriculum is not flexible. We have these gate-keeping exercises where we are asking that some dude with no arms perform a manipulation that he would never be asked to perform in the real world. The problem is the curriculum. We don't think about what it means to be a chemistry and how a particular individual can interact with the field of chemistry or how a particular individual might want to interact with the field of chemistry. Once we know those two answers, then we should investigate accommodation on a person by person basis. This would, in my opinion, make chemistry more accessible and enticing to people with and without disabilities. Instead we developed hurdles and protocols that have barely evolved since the days of Lavoisier that are based on what is convenient and economical to teach the largest number of students for the least effort. Then we force students to meet these standards. (Good Gravy, don't get me started on Common Core and students with disabilities!)

Professor,

I've recently discovered, with professional help, that I have high functioning autism. I have also recently developed lupus/RA overlap. I have long struggled with college and have yet to complete a degree program. I have studied computer programming, WMDs (US Army CBRN), emergency medicine, and more. While I was in high school, I excelled in math and science, but deep depression nearly cost my educational career and my life. While I am currently enrolled in a small online degree program for music production, I had always dreamed of becoming a physicist or a mathematician, how can I make this a reality?

Thank you

[hereticalvet](#)

I'm convinced that half of the Engineering faculty have high functioning autism. And the other half don't function that well.

You will need a good degree of flexibility and persistence. And probably expand your definition of physicists and mathematician. Few physicists and mathematicians directly do physics or math. They apply these concepts to other fields.

I'll risk being controversial ... My understanding is these two fields are not good for older, returning students. There is something about a young brain that lends itself to learning and developing physics and math. Most mathematicians do their best work before 40.

Outside of academia there are few pure physics or math jobs anyway. I'd recommend learning as much math and physics as you can and applying that to gain a competitive advantage in an applied field. You are in music now, does the physics of acoustics or math of data compression or sound mixing interest you?

Hi Professor! I'm a 4th year undergraduate who initially enrolled in engineering, with the intention of studying biomech. I have a rare genetic disorder causing avascular necrosis of the bones in my pelvis and lumbar spine. I use a wheelchair, and due to the intense levels of pain I was in as well as mechanical access barriers (I ended up doing first year chemistry without an accessible lab bench and had to do titrations above my head, where I could not easily see the setup) I ended up switching to the relatively less demanding program of biology.

Given the attitude that pervades a lot of STEM courses that if you can't hack it at the pace or level they expect of you, you might as well leave, how do we prevent students with disabilities from getting frustrated and leaving STEM programmes? I'm reminded of a first year eng physics professor who told the class on the first day that "half of you will fail, and you will fail because you are not suited for engineering". Needless to say, I found the programme extremely hostile to providing accommodations.

Do you think this is changing? Over your career, have you noticed a change in the attitudes in STEM programmes regarding students with disabilities? I had friends in first year with learning disabilities who were so disheartened by the institutional attitudes that they left STEM entirely. Anecdotally, this seems like a serious problem -- is there any concern amongst the higher ups about the loss of potential scientists and engineers because of this?

[atshirtaway](#)

Sorry that you had to change majors due to a hostile /non-accommodating environment. I wish your experience were unique or rare. Your observation is correct that this is a serious problem for pwd and hits students with learning disabilities, health issues, and other non-apparent disabilities the hardest.

But I do think the environment is slowly changing. In my experience attitudes vary greatly from school to school and among faculty within a school. While too many faculty adopt a 'blame the student first' stance, there is a greater understanding and acceptance for the moral and pedagogical need for accommodations. Watch what is going on for increased programming for underrepresented minorities and first generation students. We placed much effort to correct gender disparities in STEM and have made progress in many fields. Now the foci is shifting to underrepresented minorities. PWD are benefiting from institutional improvements although we seem to be afterthoughts in any conversation.

Hi,

What do you feel is the main reason for the lack of people with disabilities doing doctorals?

Do those with a disability have a much worse chance of getting a job once they have achieved this level?

And

I'm from Australia so I was wondering if this is a problem all over the world or just in the USA?

I ask this as someone without a disability who has achieved my honours in science (nanotechnology) and has failed to find a job (in over a year) in this area.

[Fyreclaw](#)

Congratulation on earning honours, but sorry to hear you are having trouble finding a job.

I think the main impediment is primary or middle school. There is still so much stigma in education around disability. We do not separate needing an accommodation from being cognitively incapable. In college, something like 90% of students with Individualized Education Plans (IEP) or 504s do not initially register with Disability Support Services. Data shows that if you fall behind early and earn less than a 3.0 out of 4.0 GPA in your freshman STEM major, you are unlikely to complete a STEM degree. Yes, I think the problem is global. Most other countries do not even collect data on pwd. And institutionalization of pwd, or worse, is common outside of the EU and former British Empire. In the USA, the ADA has helped with jobs and the federal government has exemptions for hiring qualified pwd. Most countries with laws protecting pwd are patterned after the ADA. Regarding pwd in the USA, I side with the author James Branch Cabell "The optimist proclaims that we live in the best of all possible worlds; and the pessimist fears this is true. "

Hello!

I am from Delaware originally and have a chronic illness that leaves me variably disabled (meaning I have my good days and bad... Sometimes I can run around, sometimes like today I'm borderline bedridden by the pain). I am myself a STEM educator, most heavily environmental science. I lost my job last year in a layoff suspiciously after beginning to request medical accommodations. Have been struggling to find one ever since- I'm still in the beginning of my career.

I've been considering starting my own organization that would focus on teaching STEM to both adults and children with disabilities, including getting them out in nature going at our own pace. Despite living in a city I worry there won't be enough of an audience to make this a sustainable business model. After all, even if there were enough disabled to participate, midi of us can't afford all our medical bills much less payments for fun events.

Where do you suggest I start with research and data to see if such a program is viable? The fact stop many of us are truly disabled but undocumented as such puts me at a loss.

(And generally for everyone, what's your opinion on the "to disclose when applying or not to disclose" disability when you're asked on forms "for statistics that will not be used in determining your eligibility")

Thank you! Go Blue Hens!

[lggySorcha](#)

Sorry that you are having troubles with finding a job and the issues with accommodations. I'd check with the Center for Disability Studies on UD campus. They have statewide reach, host or know of most programs across the state, and should be able to point you in a good direction. I don't think I'm capable of conceiving or assessing a business model more advanced than South Park's underwear gnomes.

Also, they often have needs for instructors at UD. I don't know about your degree level or their degree requirements.

I'm generally in favor of open disclosure. Ideally I want to work for an organization that accepts me as I am. I also want more pwd identification so we can gain awareness and political traction for issues. However, I understand if you don't have a job you would do most anything to get a job. There disclosure becomes a tactical decision. I can't hide a wheelchair and have my employer be surprised after the contract is signed. Your issues should not be relevant to employment (Your current health prognosis sounds a lot like Tony Romo, and he has a job) but maybe the thing to do is tactically bring them up later in the process.

At the places I've worked, those cards never leave HR and the hiring committees are insulated from the information.

Sir,

Sorry, i have not had time to read the full report as I am in mu break at work. I was wondering about the differences between PWD that have physical challenges that do not directly hinder the educational process and those with disabilities that do directly hinder the process. Ex. A person that needs a wheelchair vs. A Deaf person.

I am not objective in the issue, for I am a Deaf man in STEM (GIS analyst) myself. I know my undergrad had the extra challenge of being assigned double the reading of my peers when I was using remote captioning, and a list of other limitations on my education. I know part of GPA was due to not putting al of my effort into my education, but my being human and needing an excuse wants to blame my disability. I would like to further my education, but that is probably going to prevent me.

[xhuntus](#)

I would counter that by the definition of disability, all disabilities directly hinder the educational process. In school I had to perform bench chemistry, sideways at shoulder level with the same accuracy and precision as my peers. Add to that, limited motion and strength of my hands, makes it difficult to manipulate glassware or even write quickly and legibly. Also it is more difficult getting around in a wheelchair than walking. Imagine paying attention in class or taking a test if you had to do the energetic equivalent of wind sprints for 10 minutes between classes.

That being said, there are different degrees and challenges of difficulty associated with disabilities. I have a good friend who is a blind chemist. Neither of us can understand how the other cheerfully makes it through the day getting out jobs done. I just started needing reading glasses a couple of years ago. I went through a year on flagging productivity and headaches before realizing I needed glasses. Now my inability to read a menu at a restaurant menu when I forget my glasses in the car frustrates me more than the fact that I can't get in the restroom.

Have you looked into Rochester Institute of Technology, National Technical Institute for the Deaf? They have an amazing science and technology program with supports integrated into the university proper.

Hi! I took your class in Fall 2007 as a freshman. I think it was analytical chemistry. I was always impressed by your positivity. You were always smiling and seemed like a nice person. I'm glad to hear you're still at UD.

How long were you out of university after you were injured? What do you think made your experience different from other PsWDs who do not attain the same level of education? (Or what enabled you to keep going)

[HotSauceFlood](#)

Thanks. I appreciate the kind words. Drop me a line, I'd love to hear about where you are and how you are doing.

I broke my neck the day before Spring finals at the University of Alaska Fairbanks. Spent the summer at a rehab hospital in Denver Colorado. I made it back home to Anchorage the day after Fall classes started. I wanted to restart classes in the Fall, but my doctor and parents ganged up on me. So I took classes in the Spring and Summer in Anchorage. The following Fall I was back at UAF. By going to school over the summer, I graduated in 4 years after high school. I think my experience was different than other pwd for two reasons. First I was phenomenally lucky. I had great mentors and advocates at all levels. Plus my interests in math and statistical aspects of chemistry translated well to being in a wheelchair. Second, I never viewed myself as having a disability and people that doubted or questioned my capability pissed me off and motivated me more than set me back. Growing up my dad had what would now be diagnosed as PTSD from serving in Vietnam. My younger brother had a stroke at age 9 a few years prior. Plus my older cousin has significant autism and other disabilities. My best friend in high school had his dad die when his mom was pregnant and she was diagnosed as sufficiently paranoid that he had to live with us for a couple of years. So I looked at being in a wheelchair as an insignificant issue compared to the rest of the family and people around me.

Hello there!

I was wondering what opportunities there might be for a PWD that only has up to a Master's degree.

I received a B.S. in both Physics and Mathematics, and I was trying to get a Ph.D. in Molecular Biophysics, but I ended up getting too sick to finish so I mastered out. Luckily before I left I was able to become a NSF Graduate Research Fellow.

I have a slew of issues which make it difficult for me to work, the main of which is fibromyalgia. I'm in pain all of the time, but I have good days where I can run errands and bad days where I'm just stuck writhing in bed.

I miss research a lot, but I don't know of many good opportunities where in which not having a Ph.D. would be helpful. Would you be able to point myself and others who may be in the same boat in the right direction?

Thanks bunches!

[emoshortz](#)

That is rough! When I was an Assistant Professor at ASU, one of the graduate students in the department had exactly the same issue. She left with a MS too. I'm trying to remember her name of

where she went. That was over 15 years ago. I would check with the AAAS Project for Students with Disabilities. They have run an internship placement program there for students with disabilities for about 20 years. They might be able to point you to somebody. Also check with the DO-IT project at the University of Washington. They might not know of people also. If you can't find out how to get hold of them, email or call me. I'm not sure of the ethics of posting names and addresses on line. But I can send people I know an inquiry.

I am a freshman Biochem and molecular biology major interested in research however my mom has Best's disease which I have not been screened for. I have a 50% chance that I inherited it and will have macular degeneration and lose vision in the center of my eyes and from that become legally blind, though severity varies by person. Hers was early onset and stopped her from pursuing science, but not all cases are early onset. My question is, if I lose vision, not completely, would I even be able to go about doing research? I can see an inability to read a graduated cylinder or any instrument as problematic, and am not sure how I would progress a career if this were to become my case; science is a large part observation, but what if I can no longer observe?

[Shotgunfire1](#)

Good golly yes. Don't let that even slow you down. But you might want to guide your career towards interest where low vision will be less of an issue.

A friend of mine, who was a program officer at NSF gave a talk to a group of astronomers. He asked how many could see in the stars they were studying by eye. No one raised their hand. He concluded he was lecturing to a room full of people with disabilities that all relied on adaptive technology. Work on more instrumentation oriented fields. But most every simple lab instrument can be controlled through voice activation and have voice output. I know of a recently retired lab manager at FDA with very similar disability who did that. I'll plug my good friend Cary Supalo at Independence Science. His company makes basic lab equipment compatible with text to voice readers.

<http://independencescience.com/>

Alternately use the concern about vision loss to propel your career to become a research leader. Guide the big picture, write grants, set the agenda. Somebody has to be in charge. Might as well be you!

Hello professor,

On an earlier thread, you mentioned that physics and mathematics are subjects that benefit from a young brain. Would you say that chemistry falls in a similar category? And what advice would you give to older, returning students with an interest in STEM that have struggled in college due to mental disability?

Thanks.

[NeuroticKrill](#)

I think it depends on the sub-discipline. Physical chemistry is closer to math and physics than synthetic chemistry (organic and inorganic). I find these require very different skill sets and attract very different types of personalities. I'm an analytical chemist. Looking at my colleagues they seem to be at their best in their 50s. Analytical chemistry is really about pulling together many knowledge threads to solve a problem.

Advice: Specifics would vary with the type of disability, but my general advice is focus on your strengths and abilities. Find a field or discipline that plays to those. What you want to do is find an environment that puts your skill set in the best possible situation to help you succeed. At the same time, be aware of the limitations your disability might present and try to avoid situations where that may

become a fatal flaw. For example maybe you are great at developing creative solutions for technical problems but have sever social anxiety. Try to get a job as technical staff at a national lab, not in technical sales for a company.

What about people with mental disorders? Not all mental disorders affect intelligence/reasoning. I have PTSD and ADHD and love math and science, but, sitting in a classroom is a nightmare. I learn great by myself when I can force myself to do it. Ultimately if I could I would study math.

[Iron Bawls](#)

You mention one of the most stigmatized and misunderstood groups. I know a student who with a mental disability who is doing excellently in grad school because his advisor lets him work from home. He nearly left graduate school because his previous advisor forced him to work in a crowded and hyper-competitive lab.

I don't know what to say beyond I sympathize with your struggle. I could see your question being a note from my son 10 years in the future (just replace PTSD with social anxiety). I've watched him go from great joy and interest in science to fear and loathing of school because the classroom is not designed for ADHD and kinesthetic learning.

Hello professor, completely sincere question: why is it necessary to have people with disabilities represented in STEM fields according to their proportion of the overall population?

This sounds like part and parcel of the recent push of leftist identity-politics to make every field representative of the overall population. So what if there are fewer people with disabilities, women, or ethnic minorities in STEM? As long as particular types of people aren't being forced into or out of particular occupations, why is it necessary to implement some sort of quota? Won't it have a net negative impact on the quality of STEM graduates if people are being artificially driven into the field based on their identity rather than their inherent aptitude or interest in the subject matter?

Can you please answer this question?

[ajerimez](#)

Great question. As a conservative leaning libertarian I have wrestled with that question early on when I was becoming motivated to tackle diversity and inclusion issues. I do not think that it is necessary for pwd to be proportionally represented in STEM. In fact I would be concerned if they were. A significant portion of pwd are not capable of attaining a college degree because of their disability - my little brother had a sever stroke at 9 and my cousin is moderate-low functioning autistic. It would be unreasonable for either to get a STEM degree.

In my opinion, the population statistics serve as a place marker. If 18% of the population is Black but only 7% of STEM PhDs are Black there is a significant disparity between reality and expectations. The root causes of this disparity should be investigated. In so much as the cause is from arbitrary societal or academic structure, we should move to change the structure. Because, in that case we are inadvertently forcing people out of occupations by not providing everybody with equal opportunity. Now there by be reasons for differences in some fields. Research shows women prefer interdisciplinary research and consequently gravitate to certain disciplines or sub-fields.

In other words, there are supply-side factors driving participation and demand-side factors limiting participation. As a conservative libertarian I want to eliminate the demand-side impediments and let the supply-side forces determine participation.

Back to pwd. Proportional representation would say 13% of PhDs should have disabilities. But only 2%

have disabilities. Some portion of that difference is inherent to the nature of the population of pwd. Where would the 'equitable' level (supply-side interest and ability) be if there were no structural or societal impediments (demand-side impediments). I content that it would be higher than 2%, but not as high as 13%. If we assume that 50% are incapable by nature of their disability, we should the level be 6%. A significant potentially arbitrary societal impact on pwd.

So, please let me say that I am speaking only for myself here. The more liberal, social justice oriented people to which you reference have a whole different set of reasons independent of mine.