The Accidental Inclusivity of Virtual Spaces

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Amanda Lacy is a PhD student at Texas A&M University in the department of Computer Science and Engineering. Her interests are broad, with an emphasis on applying computing to promote access to information and spaces, both virtual and physical. She holds a bachelors in Computer Science from the University of Texas at Austin, and currently works as a quality assurance tester for Apple.

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Dr. Tracy Anne Hammond, Texas A&M University

Dr. Hammond is Director of the Texas A&M University Institute for Engineering Education & Innovation and also the chair of the Engineering Education Faculty. She is also Director of the Sketch Recognition Lab and Professor in the Department of Computer Science & Engineering. She is a member of the Center for Population and Aging, the Center for Remote Health Technologies & Systems as well as the Institute for Data Science. Hammond is a PI for over 13 million in funded research, from NSF, DARPA, Google, Microsoft, and others. Hammond holds a Ph.D. in Computer Science and FTO (Finance Technology Option) from the Massachusetts Institute of Technology, and four degrees from Columbia University: an M.S in Anthropology, an M.S. in Computer Science, a B.A. in Mathematics, and a B.S. in Applied Mathematics and Physics. Hammond advised 17 UG theses, 29 MS theses, and 10 Ph.D. dissertations. Hammond is the 2020 recipient of the TEES Faculty Fellows Award and the 2011 recipient of the Charles H. Barclay, Jr. '45 Faculty Fellow Award. Hammond has been featured on the Discovery Channel and other news sources. Hammond is dedicated to diversity and equity, which is reflected in her publications, research, teaching, service, and mentoring. More at http://srl.tamu.edu and http://ieei.tamu.edu.

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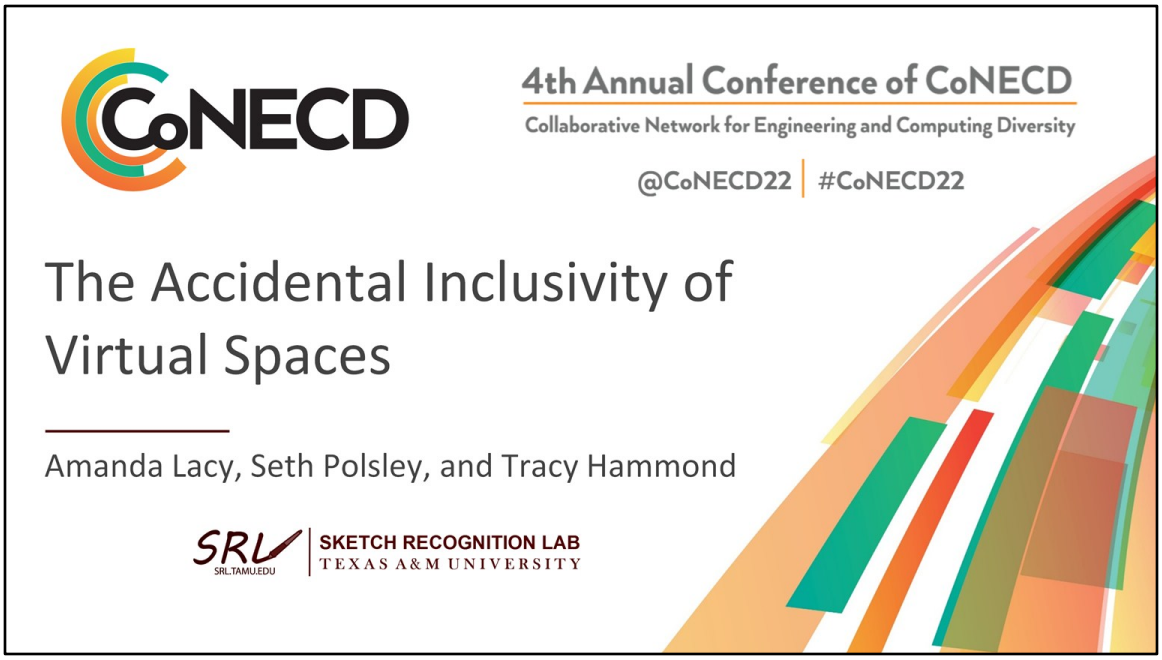

Thank you for attending our talk on the Accidental Inclusivity of Virtual Spaces

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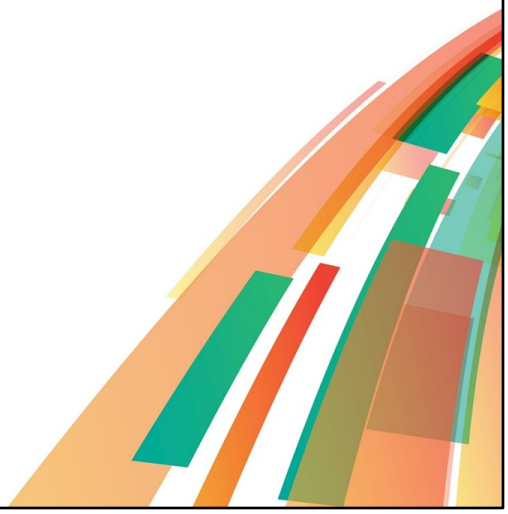
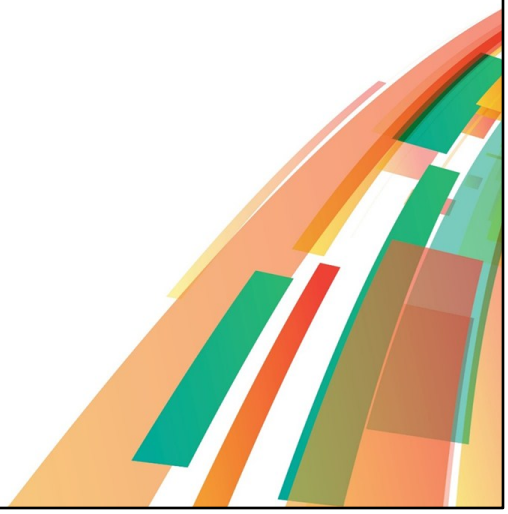


To give you a brief overview of this presentation, we'll be starting with some background and motivation and also talking a bit about myself since my own experiences heavily motivated this work. Then we'll go into a discussion of the extensive surveys and interviews we conducted before moving into key takeaways and closing thoughts.

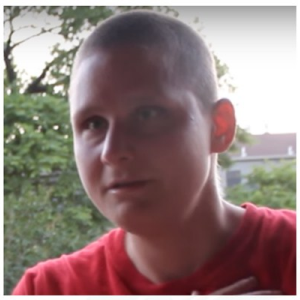
Introduction and Related Work



To start off with a bit about myself...

About Me

- My name is Amanda Lacy
- I am a graduate student at Texas A&M University
- I have been completely blind my whole life
- I was very isolated as an undergrad. School was in person, and I can't identify people in large groups.
- Remote work changed my life.



2016

2021

My name is Amanda Lacy. Up front, I will let you know that I have been blind all my life. This means that my eyes will tell you very little about how I feel about you. This also gives me a perspective on the switch to and from virtual that has happened in our society.

I worked remotely as a tester for Apple long before the pandemic; this was an awakening into a kinder, more structured world. I recovered from the deep trauma of hardships of my BA in computer science at the school that cannot be named (hiss).

For me, the virtual world has gotten better and better as the pandemic caused everyone to hone their tools. Everyone now knows how to attend a virtual meeting, and the platforms continue to improve.

I was intrigued by how this world I chose to be in and wanted to keep was affecting other people. A surprising number of them seemed to want to make virtual a thing of the past, just an an unwelcome thing that happened that they could say "goodbye" to.

So, I started a research project to understand the benefits, drawbacks, and

frustrations of virtual spaces. I want to be an advocate for the virtual experience that I need as an adaptive aid so that it isn't eliminated. The move to virtual wasn't created as a disability accommodation—but it is. Now, I am in the position of defining the 'bugs' in the system that make it work poorly, not just for blind people, but for everyone.

Inclusivity in “The Before Times”

- While there were increasing virtual opportunities before the pandemic [1], the majority of positions were in-person.
- Inclusion could be haphazard.
  - In schools, professors may be under-trained in awareness [2,3]
  - In the office, workers may not see it as a motive for innovation, and there may even be forms of prejudice or discriminiation [4–7]
- The design of physical spaces (like classrooms) has excluded some people.

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Even before the pandemic, there was increasing opportunity for virtual work as companies expand and diversify their work forces [1]. However, the majority of positions were in-person, and certainly most schools were focused on in-person. I call this “The Before Times”: when we were going in-person and dealing with everything associated with that.

In the before times, inclusion could be haphazard: seen as a “thing we must do” like taxes or charity. Professionals may not think of it as a motive for change and improvement; instead, they may view it as a necessity which limits otherwise achievable productivity. Considering inclusion and accessibility for those with physical or cognitive disability, research in academia has shown faculty lack awareness about ADA compliance and some faculty report they would rather not plan for access but only provide accommodations as needed, which is by legal obligation [2,3].

It can seem that companies and institutions will drag their feet or just go through the motions of handling accommodations for legal purposes. Research has revealed there is even prejudice or resentment against those with disability, as well as workplace issues like wage disparity and harassment [4,5,6,7].
(https://www.hrdive.com/news/why-do-pay-gaps-persist-for-us-workers-with-disabilities/581533/)
Oftentimes, the problems aren’t intentional. The best way I can describe it is feeling like a fish out of water.

Problems in “The Before Times”

- At a movie night at A&M, I asked for audio description. They provided closed captioning.
  - Anyone seated in a bad spot (or behind a tall person) could not see the movie screen.
- An accessibility conference was held in a room with a step at the entrance.
- A celebration of White Cane Day was held in a venue with loud, booming music. Some attendees could not navigate through this noise.
- Enormous quantities of time were wasted in transit to work and school, especially for people who could not drive.
  - People who arrived on time had to wait for those who arrived late.

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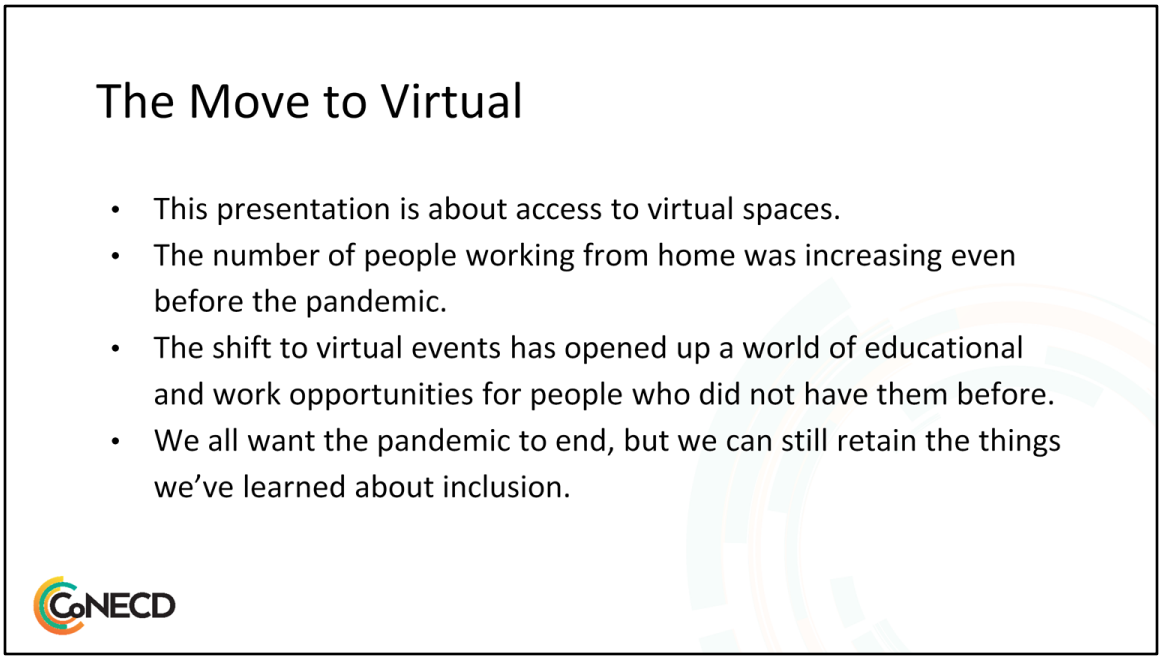
To give you a few anecdotal examples of incidental exclusion:
I attended a movie night and when asking for audio description, they provided closed captions!
One of my co-authors relayed an experience of attending an accessibility talk that was in an inaccessible room
Also, people had general problems like time spent traveling and then having to wait for everyone else to arrive



The switch to virtual events instantly improved my quality of life and increased ability to function. For example, my inability to drive severely limited her choices in the pre-virtual world, but today,, a blind person may attend a virtual meeting from home rather than negotiating the many hazards of public transport, taxi rides, or ride-sharing.

The shift to virtual events has opened up a world of educational and work opportunities for many people who did not have them before. The virtual world does not require one to physically move oneself to a new location for every single class, meeting, or conference. When some people arrive late to in-person events, those who come on time have to wait around for them with nothing to do.

In this research, we were motivated to hear from other people about their experiences and use that to learn about what we can retain and what we can improve in these dynamic times.

The Move to Virtual in the News and Research

- With the transition being global and sudden, we saw a lot of discussion in the news about impacts on schools, the workplace, and everyday life
- Including some perspectives from those with disabilities, like the small sampling below:
  - "As Colleges Strive for a Return to Normal, Students With Disabilities Say, 'No Thanks'" – The Chronicle of Higher Education
  - "We're Fumbling the Return to Physical Offices" – Scientific American
  - "For Apple And Others, Accessibility Makes The Return To Office Life Greater Than Culture Or Policy" – Forbes
- The research community has been studying this topic extensively, including aspects of remote work and online learning from before the pandemic

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I follow a lot of news and found extensive discussion around the pandemic, the shift to virtual, and its effects on various people. From the perspective of disability in particular, I noticed some benefits others were reporting in their schools and workplaces.

Of course, there were others who had more negative experiences or even lost their jobs. We also looked to the research community who has been studying the topic of remote work since even before the pandemic to gain some additional perspectives.

Related Works

- Remote work has downsides
  - "Students Attending School Remotely Suffer Socially, Emotionally, and Academically", A Duckworth, *Educational Researcher* [8]
  - "Social Isolation and Stress as Predictors of Productivity Perception and Remote Work Satisfaction during the COVID-19 Pandemic", F Toscano, *Sustainability* [9]

For instance, some studies in schools and offices found that there was an increased sense of isolation among some which had negative effects. For high school students, they had a small decrease in social, emotional, and academic well-being pre vs. post covid [8]. And for those doing remote work, some workers were found to be more susceptible to feeling isolated which led to a decrease in job satisfaction [9]. An interesting part of this study regards the connection between remote work and the pandemic, acknowledging that some factors of dissatisfaction with remote work stem from the distancing caused by the virus.

Related Works

- Researchers have pointed out that we sometimes mistakenly conflate the pandemic and remote work
  - "The Difference Between Emergency Remote Teaching and Online Learning", C Hodges, *Educause* [10]
- There have also been benefits among hiring managers and future job prospects
  - "The Future of Remote Work", A Ozimek, SSRN [11]
    - "The perceived benefits of working remotely are causing businesses to significantly increase plans for remote hiring in the future"

Indeed, researchers have pointed out that we sometimes conflate the pandemic itself with remote work and learning, but it is important to remember there is a distinction between online learning being an intentional and planned operation versus the emergency shift to online which happened during the pandemic [10].

If we look just at the remote work practices and how companies are planning to move forward, one survey of 1500 hiring managers, ranging from managers to corporate executives, found that "the remote work experiment has gone better than expected for hiring managers," suggesting some future benefits that may be kept from this time [11].

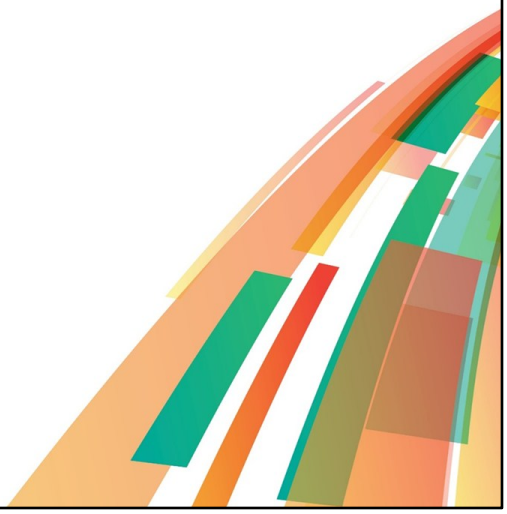
Related Works

- Some studies and reports have sought to understand more about these differences so that we can improve everyone's experiences
  - "'It Feels Like I am Talking into a Void': Understanding Interaction Gaps in Synchronous Online Classrooms", M. Yarmand, *CHI Conference on Human Factors in Computing Systems* [12]
  - "Leveraging the shift to remote work to increase employment of people with disabilities", Brief from *Employer Assistance and Resource Network on Disability Inclusion*, Cornell University [13]

The authors of this work firmly hope that we can move into a post-pandemic time in which people can again socialize and travel, but that we can keep some of the benefits of what we have learned.

Other researchers and professionals have demonstrated ways we should try to understand the current challenges and attempt to adapt to them moving forward [12,13].

Methodology



My research was motivated by how much of my own experience improved with the shift to virtual, and from all this background research, we decided to talk to people about their own experiences of virtual and in-person.

Surveys and Interviews

- We made a survey to hear from people about their own experiences with virtual and in-person
- We provided an option for follow up interviews
- Shared it on disability-related social networks and through university channels
    - Reached out to students, professionals, people with disabilities, etc.

I expected other people with disabilities to have differing experiences, since I came from a technically savvy background and didn't have to shift my work style during the pandemic. For me, virtual was a familiar environment in the comfort of my home. I know this wasn't the case for others. For this reason, I wanted a broader perspective of other people's experiences.

We conducted an anonymous survey with the option for a follow-up in a zoom interview. We collected specific feedback regarding inclusivity in virtual, in-person, and hybrid spaces. Our goal is to build a greater understanding of the issues and personal challenges faced by those who have access or equity concerns.

By gathering the perspectives of a broad spectrum of individuals through surveys and follow-up interviews, like parents with young children or disabled students, we can use a mix of qualitative and quantitative methods to discover the key challenges against greater inclusivity in virtual settings, and provide guidance for some of the changes institutions should consider to support access for everyone.

Survey and Interview Structure

- Survey consisted of 36 questions divided into three sections: demographics, virtual experiences, and in-person experiences.
- In each section, we asked a mix of Likert scale questions and free-form responses.
- Asked about comfort (e.g., freedom to move around, willing to have a webcam on), how well they could meet their goals, or if the modality "fit" with their life, among others
- In the interviews, we conducted a semi-structured discussion of the responses from the survey

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Participants responded to the online survey, which consisted of an introduction and 36 questions divided into three sections. The sections had Likert scale questions and free-form responses which were later analyzed using the Grounded Theory approach.

We really wanted to cover some different aspects of virtual and in-person, so the sections included questions about comfort with a webcam being on, the freedom to move, how well they could meet their goals in each circumstance, or if the modality "fit" with their life. The introduction invited the participant to think about the events they participated in most frequently, both virtual and in-person, and consider how well these formats met their working, access, and social needs.

Our optional follow-up interviews were semi-structured discussions based on the responses provided in the survey, and we found that participants had a lot of personal experiences to relate, which we will highlight in a later section.

Sample Survey Questions

A few sample questions:

- In virtual spaces, how often do you feel heard, like you are talking to another person, and experience a satisfying sense of social connectedness when you leave?
- Last time you attended a virtual event, were you able to access and use the things you needed to participate, e.g. the technology, a quiet space?
- How early/late do you typically arrive at virtual events?
- In in-person settings, do you have freedom to move as much as you'd like?
- How well do in-person settings (e.g., classrooms, meeting rooms, conference hotels, restaurants) facilitate meeting people, or social interactions for you?
- Do you feel that in-person formats allow you to get your work done and meet your goals? Feel free to describe why or why not.

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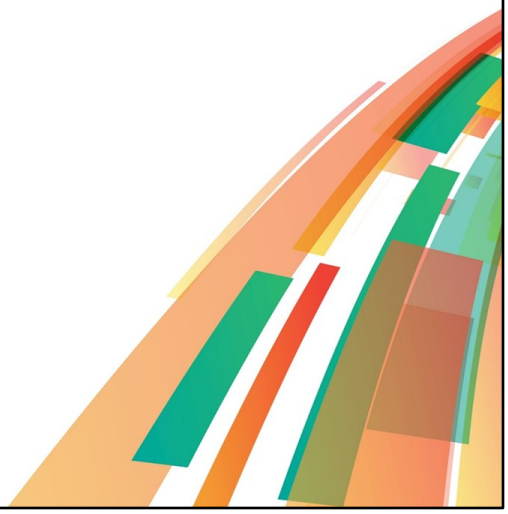
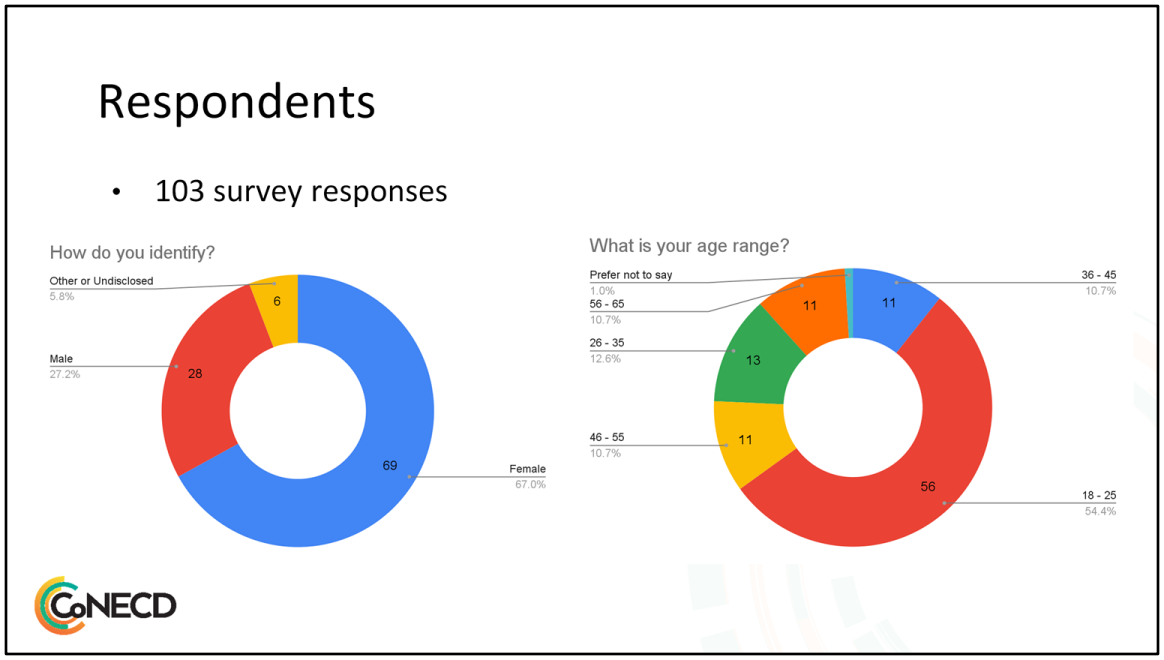
This slide shows some of the sample questions from different sections of the survey. These include questions like "how often do you feel heard in a virtual space" or "do you feel in-person formats allow you to get your work done and meet your goals?"

Survey Highlights



Now talking about the survey results...



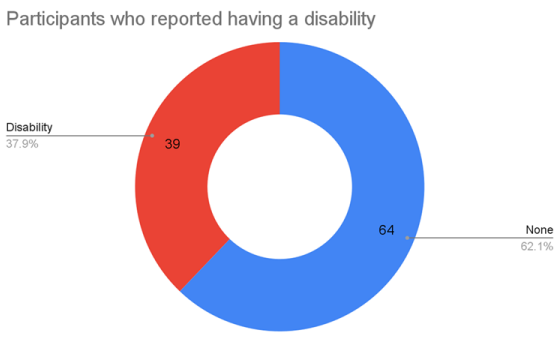
A total of 103 people took the survey. Of these, four did not identify their gender, two wrote in their own gender descriptions, 28 were male, and the remaining 69 were female.

In terms of ages, a majority of our participants were younger, with around 54% being between the ages of 18 and 25. While skewed towards the college side, we were satisfied to have at least 10% from each of the other age ranges of respondents, 26 to 35, 36 to 45, and so on until 65.

Interestingly, men reported that they were a little more extroverted, and slightly less comfortable with the virtual interaction than women. Men also reported going to events a little earlier than women on average.

Respondents

- 39 reported having at least one disability (with some reporting multiple)
  - visual: 14
  - mobility: 9
  - cognitive: 17
  - other: 18

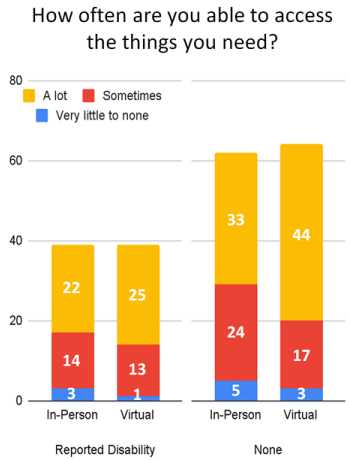


Out of the total 103 respondents, 39 self-identified as having some form of disability. We allowed people to list anything, including multiple. A quick breakdown from a high level is:
visual: 14
mobility: 9
cognitive: 17
other: 18

Access

- Virtual improved access for everyone across the board!
- Considering both those who reported disability and those who did not, the number of those with “A lot” of access increased from 55 to 69

Note: Because all questions were optional, there are occasional mismatches in number of responses if a participant chose not to answer a specific question

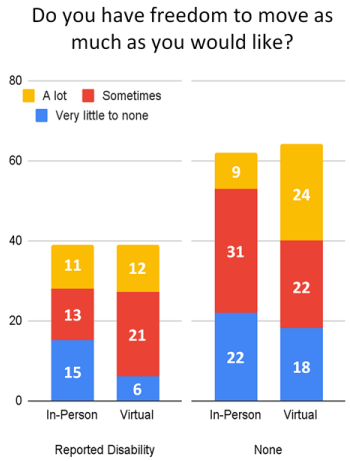


We asked “*When you attend events, how often are you able to access and use the things you need to participate?*” for both virtual and in-person and found that everyone reported improved access.

Only 1 person who had reported a disability said they had very little to no access to participate over zoom, which is a very good finding. Considering both those who reported disability and those who did not, the number of those with “A lot” of access increased from 55 to 69

Comfort

- All participants reported increased freedom to move
- Those who reported having a disability and reported “Sometimes” or “A lot” increased about 50%: from 24 to 33
- Those who did not report having a disability felt more comfortable as well, going from 9 to 24 reporting “A lot” of freedom



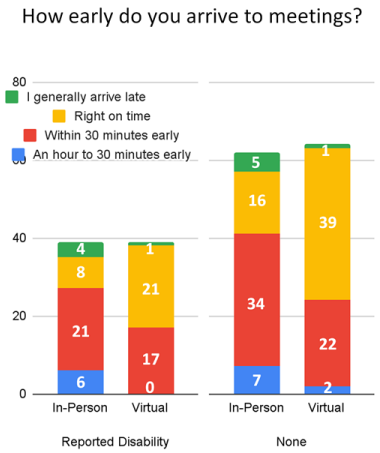
We also asked participants how much freedom to move they felt they had in the different modalities, and again, everyone reported improved freedom of movement. The change was especially notable for those who reported having a disability since the number of those who reported “Sometimes” or “A lot” increased about 50%: from 24 to 33

For the other participants, this number went from 40 to 46

But it was also notable how those without disability said they felt a lot more comfortable. This number went from 9 to 24 from in-person to virtual meetings.

Arrival Times and Travel

- One side effect of virtual meetings has been the removal of travel times between meetings
- Many more people go to virtual meetings just as they are starting
- This matches well with the results of our free-form question about the negatives of in-person events
  - The most frequent complaint was travel (n=24)



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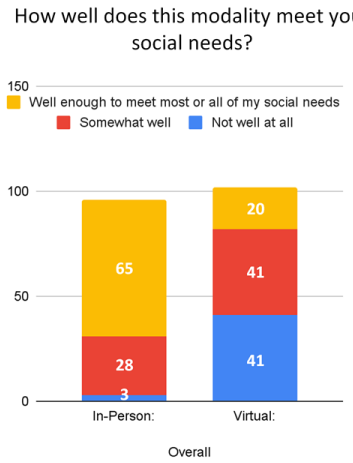
Social Limitations

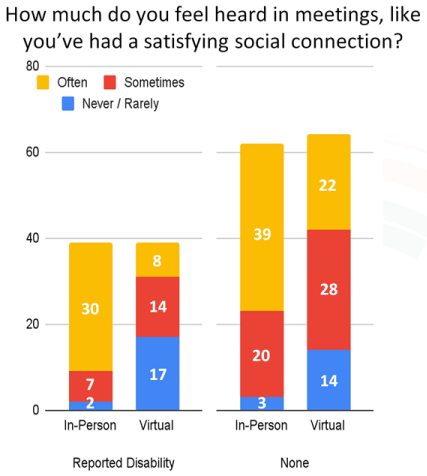
- The most significant downside that was reported regarding virtual meetings is the lack of social interaction
- Consistent across all groups



A negative of virtual is definitely social interaction. This was reported consistently across all groups and participants. There were a handful of individuals who said they still preferred virtual because it led to less anxiety, but there was generally a lot of concern regarding the lack of body language, atmosphere, sense of touch and togetherness, etc.

Summary and Other Concerns

- The results indicate that virtual meetings can increase access and flexibility
  - Also some humorous responses
- However, there are still major downsides, like the limited social interaction
- For instance, those with disability were more likely to say they didn't feel heard in meetings or didn't have a meaningful social interaction
- There are positives, but there are also problems to be solved

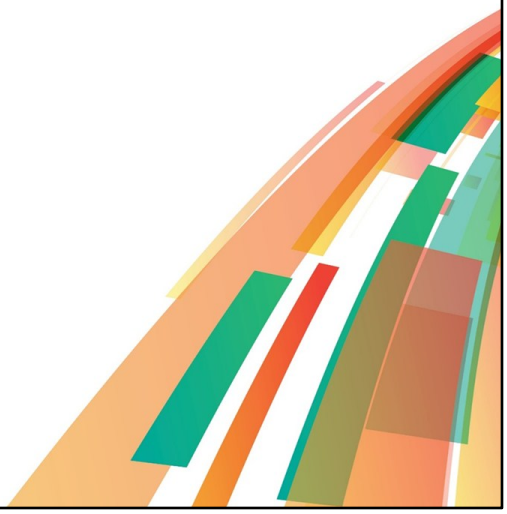


We did find support for increased access and freedom to move. We also got a couple humorous responses, such as one respondent lamented that they missed taking off-world trips. Evidently, this person finds the virtual experience inferior to life aboard a star ship.

However, virtual is not without it's downsides. In particular, the social angle is worth exploring further, as those with disability disproportionately struggled with feeling heard and having meaningful connections

We will carry some of these thoughts forward into the recommendations section

Interviews



Next we will talk about interviews

Interviews Overview

- We conducted 12 semi-structured interviews
- The following discussion groups the key takeaways as archetypes:
  - students
  - professionals
  - those who reported having a disability
- The interviews were conducted over Zoom, taking approximately an hour and using the software's recording and transcription capabilities
- We applied qualitative content analysis to identify some common themes

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We conducted 12 interviews in total, comprising people from several age groups and backgrounds.
The interviews were conducted through Zoom, taking approximately an hour. Interviews were recorded and transcribed using Zoom's built-in recognition software, and we applied qualitative content analysis to identify some common themes

Interviewee Demographics

- 5 reported having a disability, 7 did not
  - Of those who reported having disability, some reported multiple disabilities

Age Range	Count
18-25	4
26-35	2
36-45	2
46-55	3
56-65	1

Gender Identify	Count
Female	6
Male	4
Two spirited	1
Prefer not to say	1

Reported Disability*	Count
None	7
Chronic Illness	4
Vision	2
Hearing	1
Mobility	3

*These numbers include those who reported having multiple disabilities

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We covered age groups ranging from 18 to 65, with 4 in the range of 18-25, 2 from 26-35, 2 from 36-45, 3 from 46-55, and 1 from 56-65
6 participants identified as female, 4 as male, one as two-spirited, and 1 preferred not to say
5 reported having a disability and 7 did not
Of those 5, 4 of them reported having chronic illness, 3 of them reported a mobility-related disability, 2 had a vision-related disability, and 1 hearing-related

Students

- It can be surprisingly hard to get your work done when you're quarantined in the dorm
- Virtual lectures are often boring.
- Most students turn off their cameras (professor's space).
- Students miss in-person classes and events too.
- In-person classes might be spread too far apart, hard to buy food to eat and make it to class on time.
- Walking around, searching for good wifi signal to take an exam.
- Virtual collaboration might be easier than in-person collaboration.

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Students seemed generally lonely. Most of them, even the ones who found in-person classes difficult, were looking forward to going back. One student was doing well in his classes until he was quarantined and lost all structured activities. The loss of all routine and requirement to do everything in his dorm room sapped his motivation. He found himself falling behind,, and doing homework during class lectures. Virtual lectures frequently left students feeling like they were watching a Youtube video, rather than attending a lecture. Students also reported that most of their classmates kept their cameras off during lectures. They said, "it feels like the professor's space." As a result, professors feel like they are talking into a void. Interestingly, some types of student collaboration might be easier virtually. One student described having more teammates to choose from, and feeling more at ease asking "dumb" questions online. Students generally lack their own houses and high-speed internet connections. Consequently, they spend most of their time around one another, competing for the wi-fi signal. One student rated several spaces on their college campus based on the strength of the wi-fi.. This student did not have a good workspace at home, so was forced to attend lectures and take exams from the college library. Since all students were required to keep their webcams on during exams, the internet signal was insufficient for everyone who needed to use it. As a result, this student described being "kicked out" of a test more than once, and having to contact a professor to retake it. The in-person infrastructure had its problems too.

Someone complained about unwanted weight loss because classes were spread so far apart that it was a challenge to buy enough food and also make it to classes on time.

Professionals

- Everyone complained that their non-preferred format was too distracting, e.g., someone who preferred working from home disliked office noise..
- Those oriented toward in-person work were motivated to do work by the physical presence of people.
- They thought of time and expenses to get there as an investment.
- People who preferred virtual events were self-reliant.
- They thought of the expenses of in-person events as wasteful.
- Everyone generally missed the lunches and other social events with co-workers.

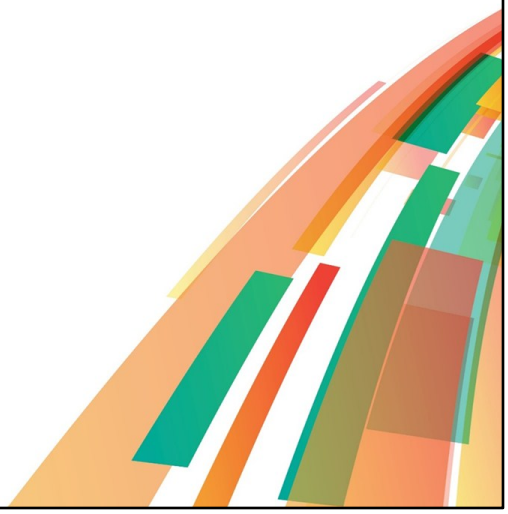
Some people commented that remote work gave them more time to prepare healthy food, but this was bitter-sweet. They generally missed lunches and other in-person interactions with their co-workers. Professionals who liked the office described various distractions they had to surmount or ignore while working from home, including their children, pets, and chores that needed doing around the house. Those who preferred virtual work complained about thin office walls that did little to block out the conversations of their co-workers, along with other noisy office distractions. People often cited distractions as reasons against their non-preferred format. For people who preferred to work in-person, the physical presence of other people was what motivated them to do the work. For them, the cost in money and time that it took to participate was an investment, and this helped them to take the event seriously. People who expressed a preference for virtual events considered these expenses to be wastes of time. These people felt that in-person events were an affront to their autonomy. They were less reliant on other people for motivation to get work done.

Students and Professionals with Disabilities

- Virtual does not automatically mean accessible.
- Interpreting virtually for someone hard of hearing or deaf can be complicated.
- Zoom captions don't work in breakout rooms.
- Sign language is harder to see over video.
- Games (e.g. Kahoot) and educational platforms may still not work with assistive software.
- Noise-sensitive people (e.g. people on the autism spectrum) benefit from working at home.
- The removal of the travel requirement was a huge relief for some people.
- Some students with physical disabilities felt more like participants at virtual events.

Having a disability does not predestine someone to like either virtual or in-person interactions. They can face additional challenges in either format. For example, a student with a hearing impairment joined a virtual class with an interpreter who was logging in from somewhere on the other side of the country. The lag in communication was terrible. Sign language speakers have to deal with the interpreter, plus sign language can be harder to understand through these video platforms. Much of the software that we use and take for granted is not designed right so that it can be useable by people with disabilities. A virtual activity that is supposed to be fun (like a game of Kahoot) can exclude someone who is accessing it through a screen reader and text-to-speech software. In-person events can be overcrowded, and too loud for people who are noise—sensitive. Physical events that are too spread out can pose huge challenges. These include finding a map that is friendly to pedestrians or wheelchairs, and actually getting there. Like the Kahoot example from the online world, people with disabilities are often invited to participate in activities that they don't enjoy, or don't do well.

Themes and Recommendations



Now for some key themes and associated recommendations

The Power of Place

- "I don't work from home, I live at work."
- "My dog is concerned that I am talking to strange voices."
  - Our brains have not evolved to do many things in a single place.
  - We have difficulty tracking all the things that happened at a single computer terminal, or we can become easily distracted and have difficulty paying attention
    - "I was staring at the wall, thinking about Mars colonization."
  - Creating novel virtual environments could improve virtual learning.

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We had a couple interesting comments regarding working from home, like
"I don't work from home, I live at work." or
"My dog is concerned that I am talking to strange voices."

This is because our brains have not evolved to do many things in a single place.
We have difficulty tracking all the things that happened at a single computer terminal, or we can become easily distracted and have difficulty paying attention
One person said he "was staring at the wall, thinking about Mars colonization" during class.

Recommendation: Setting Up An Office To Separate Work, Play, And School

- Having a specific space for work vs play can help with focus or comfort
  - "I set up a workspace in my parents' workshop."
- Likewise, maintaining professionalism and routine like dressing appropriately and attending meetings on time are important to establishing the "Power of Place"

It is critically important to have a setup at your home where you can separate work, school, and play. Those who we spoke with who felt most productive and comfortable had home office setups or specific spaces where they could work, even if it was just a workshop.

Likewise, for students and workers, it is important psychologically to maintain professionalism and routine by dressing appropriately and attending meetings on time. Though it is tempting to dress more casually at home, we heard from people who said their meetings had become too casual and that keeping the routine of treating virtual work like in-person work helped them.

Why Disable Chat?

- Chat was disabled in some classrooms.
- Chat empowers people who would have difficulty speaking, or who just do not want to interrupt.
- Can you think of some motivations that people might have for turning off chat?

Another interesting concern was around the usage of chat in the classroom.
Students used this a lot to engage with others in a less disruptive way during class, especially for those who felt uncomfortable speaking or having their camera on.
Unfortunately, some classrooms disabled chat.
What would these reasons be?
We assume that some professors found it distracting, or they worried about what students might say.
But we don't believe disabling chat is a good solution.

Recommendation: Anonymous Chat

- This would allow people to send anonymous messages to the group or an individual.
- This could allow people to voice unpopular opinions. Think of it like the secret ballot, liberated.
- People can respond to anonymous messages so communication is open and honest.
- This feature can be disabled or moderated
  - Moderation could enable meeting hosts to temporarily ban a user from anonymous chat without knowing who they are (i.e., “disable author of this message from using anonymous chat”)
  - This could also be managed with a group through some form of anonymous voting to reduce the burden on hosts
  - Software could be used to prevent spamming or sending abusive messages

A better option would be to provide a computer- or human-mediated anonymous chat.
This would allow people to send anonymous messages and feel more comfortable engaging in the group, a good alternative for those who are too shy to speak up or use their webcam
But to address concerns about abuse, the feature could easily be disabled, or more importantly, moderated.
Rather than having to reveal someone for their chat, the moderator could simply ban the author of an anonymous message from using the anonymous feature for a time.
This could also be managed by a group vote of some kind, or software that intelligently filters or blocks certain types of messages or attempts at spam (similar to the filtering used in some social media but more specific to meeting or classroom interactions)

Bureaucracy and Virtual

Too Many Platforms

- HIPAA compliance requires two platforms (no two platforms have all features that are needed).

Access to Supplies

- Someone was unable to stock their own (in-person) office with a stapler without a requisition form.

When looking at the effect of virtual on bureaucracy, we heard some comments about the difficulty of dealing with many virtual platforms. This seems to be a policy problem for some workplaces that implement too many systems for their workers to learn.
We heard one specific story where bureaucracy had led to a very difficult system for workers. One person said he was unable to stock his own office with a stapler without a requisition form.

Recommendation: Better Practices for Virtual Workers

Allow people more freedom to use their own items as needed

- The worker who had difficulty obtaining a stapler was happier just using their own stapler at home

Simplify meeting structure and bring in leadership

- As opposed to those who disliked multiple platforms, a couple professionals said there workplace quickly adopted successful virtual meetings. They felt the leadership was more present in virtual since they saw them in more meetings and could talk with them
- This depends on company structure, but leadership should consider virtual as a means to easily connect with workers

Companies need to adapt to better practices for virtual workers, which look at virtual work as an opportunity rather than a problem.
For instance, allowing people a little more freedom can save a lot of grief. The worker with the stapler issue was much happier working from home because he just used his own stapler.
Likewise, those companies that used fewer platforms and quickly adapted to virtual meetings, had employees who felt more comfortable in the transition. A couple of our interviewees mentioned that they felt the leadership were more approachable since they saw them in the virtual meetings and could speak with them, which they could not as easily do in-person since they may not all be in the same meetings or same parts of the building.
Implementing these practices does depend on the company's culture, type of work, and a number of other factors, but it is clear that are opportunities to virtual that company leaders need to consider, as we also referenced in the related works section.

Interruptions and Latency

- Latency makes all the gaps in a conversation hard to interpret.
- The exaggerated pause after a joke makes it fall flat.
- People interrupt each other constantly.
- Apologies are even more disruptive.
- We need a simple hand signal to defer to others.

One of the key technical challenges with virtual meetings is due to people's reliance on in-person cues during conversations. Latency and lack of certain social cues can lead to interruptions and make meetings more difficult. The exaggerated pause after a joke makes it fall flat. Apologies are even more disruptive.

Recommendation: Robert's Rules Of Order Implemented Via Computer

- Replace the chairman with a program.
- The chairman is not bogged down by procedural details.
- The chairman does not have to seem rude by cutting off someone's microphone.
- The chairman cannot be accused of favoritism (the computer did it).
- Alternatively, some form of auto-selection based on who's speaking to allow for more unstructured discussion

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Software can help remedy the issues with latency and interruptions by providing more structure in terms of who is speaking when.
We would propose a system like Robert's Rules of Order that dictates a structure of who is speaking when.
However, the software acts as the chair to reduce the burden on hosts, and no one has to seem rude by cutting someone off or have the appearance of favoritism.
This could also be implemented in a less structured way by having the computer auto-select the current speaker based on microphone levels and pauses between speakers. This could mute others temporarily to reduce interruptions until an intended pause, allowing discussion with less latency-induced interruption.

Thank you for listening! We are excited about this research and learning more about people's needs and how technology can help address them.

Bibliography

[1] Martins, Luis L., and Christina E. Shalley. "Creativity in virtual work: Effects of demographic differences." Small group research 42, no. 5 (2011): 536-561.

[2] Stevens, Chad M., Elizabeth Schneider, and Patricia Bederman-Miller. "Identifying faculty perceptions of awareness and preparedness relating to ADA compliance at a small, private college in NE PA." American Journal of Business Education (AJBE) 11, no. 2 (2018): 27-40.

[3] Huss, John A., and Shannon Eastep. "Okay, our courses are online, but are they ADA compliant? An investigation of faculty awareness of accessibility at a midwestern university." ie: inquiry in education 8, no. 2 (2016): 2.

[4] Dovidio, John F., Lisa Pagotto, and Michelle R. Hebl. "Implicit attitudes and discrimination against people with physical disabilities." In Disability and aging discrimination, pp. 157-183. Springer, New York, NY, 2011.

[5] Baldwin, Marjorie L., and William G. Johnson. "Labor market discrimination against men with disabilities in the year of the ADA." Southern Economic Journal (2000): 548-566.

[6] Kruse, Douglas, Lisa Schur, Sean Rogers, and Mason Ameri. "Why do workers with disabilities earn less? Occupational job requirements and disability discrimination." British Journal of Industrial Relations 56, no. 4 (2018): 798-834.

[7] Holzbauer, Jerome J., and Norman L. Berven. "Disability harassment: A new term for a long-standing problem." Journal of Counseling & Development 74, no. 5 (1996): 478-483.

[8] Duckworth, Angela L., Tim Kautz, Amy Defnet, Emma Satlof-Bedrick, Sean Talamas, Benjamin Lira, and Laurence Steinberg. "Students Attending School Remotely Suffer Socially, Emotionally, and Academically." Educational Researcher, (July 2021).

[9] Toscano, Ferdinando, and Salvatore Zappalà. "Social isolation and stress as predictors of productivity perception and remote work satisfaction during the COVID-19 pandemic: the role of concern about the virus in a moderated double mediation." Sustainability 12, no. 23 (2020): 9804.

[10] Hodges, Charles B., Stephanie Moore, Barbara B. Lockee, Torrey Trust, and M. Aaron Bond. "The difference between emergency remote teaching and online learning." (2020).

[11] Ozimek, Adam. "The future of remote work." Available at SSRN 3638597 (2020).

[12] Yarmand, Matin, Jaemarie Solyst, Scott Klemmer, and Nadir Weibel. ""It Feels Like I am Talking into a Void": Understanding Interaction Gaps in Synchronous Online Classrooms." In Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems, pp. 1-9. (2021).

[13] Employer Assistance and Resource Network on Disability Inclusion. "Leveraging the shift to remote work to increase employment of people with disabilities." Cornell University, (2021). https://askearn.org/wp-content/uploads/2021/08/EARN_2021_Practice_Brief_Remote_Work.pdf

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This slide lists the references that we cite throughout the presentation