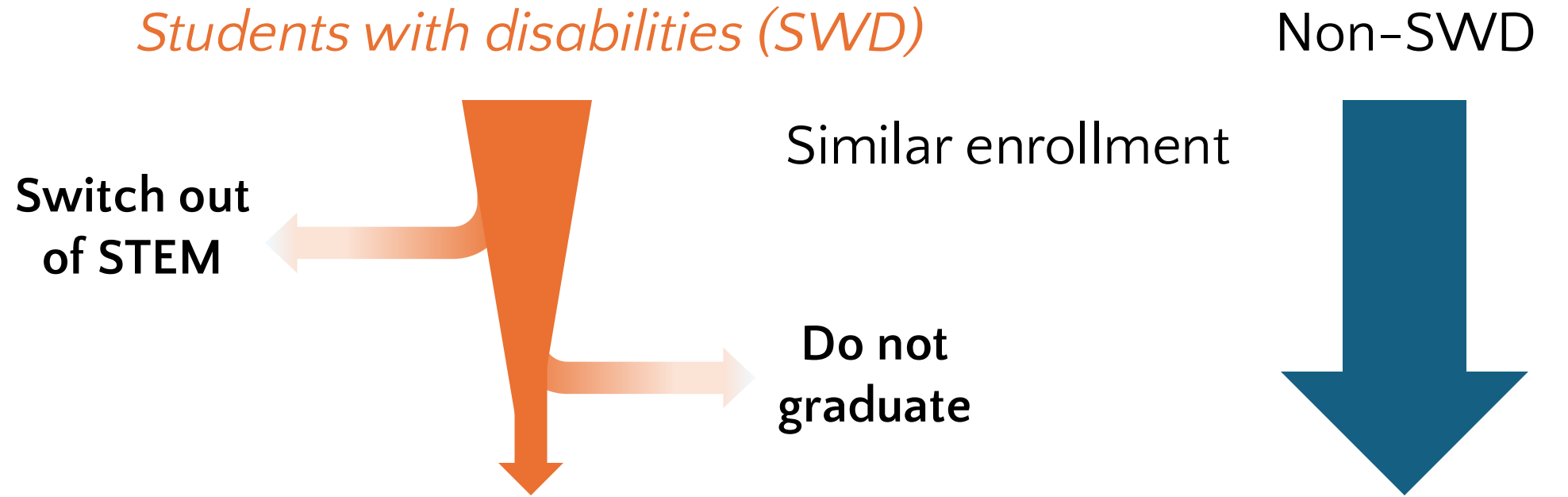


Edited captions on recorded lectures make STEM courses more accessible for students with disabilities

Poorvi Datta, Mallory Rice

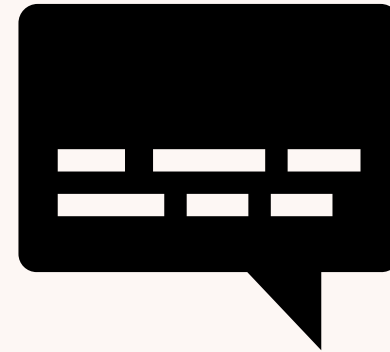
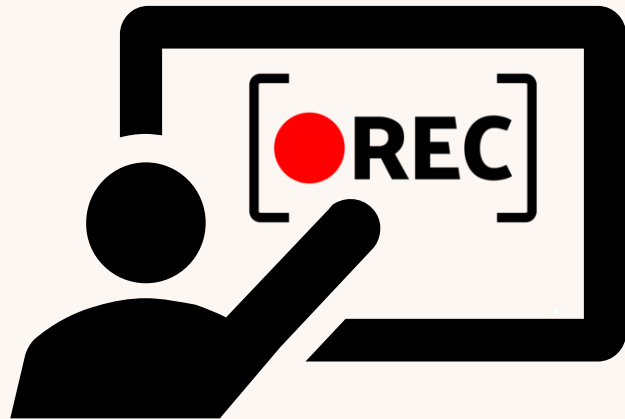


Problem: SWD are not retained in STEM

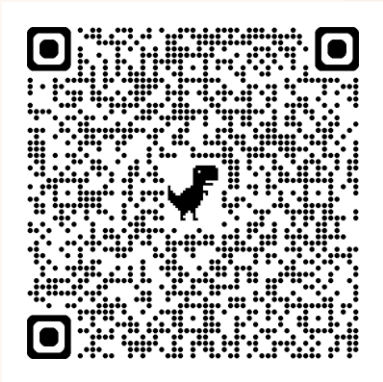


Low proportion of SWD graduate with STEM majors

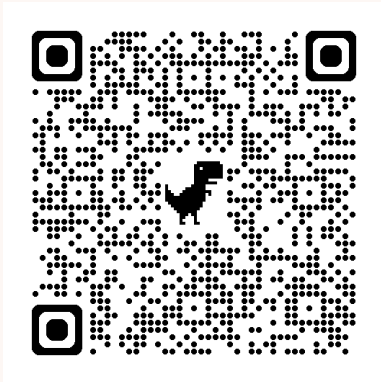
Potential equity tool: recorded lectures with captions?



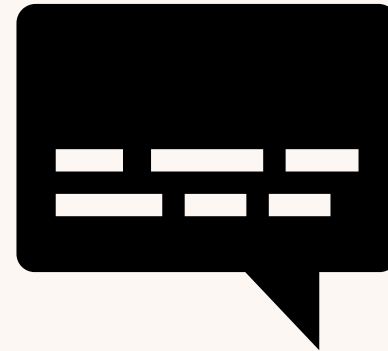
Potential equity tool: recorded lectures with captions?



Leadbeater, Wendy, et al. (2013). *Computers & Education*.



Williams, J., & Fardon, M. (2007). In *ALT-C*.

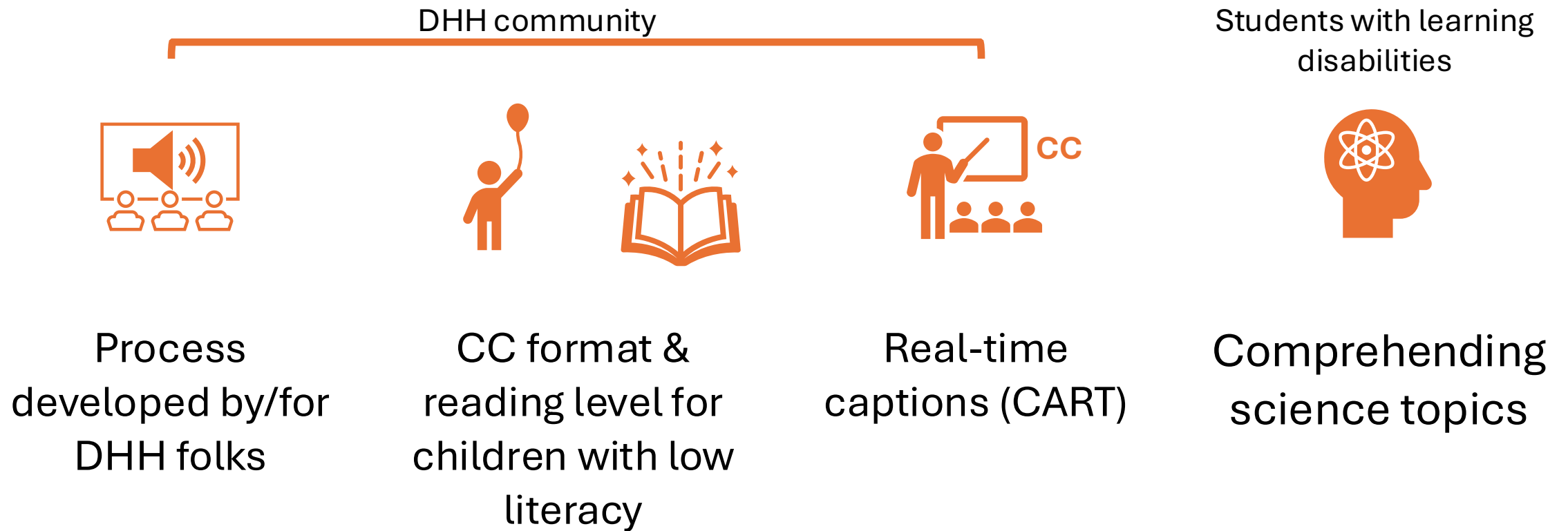


How might captions impact the academic experiences of students with different disability subtypes?

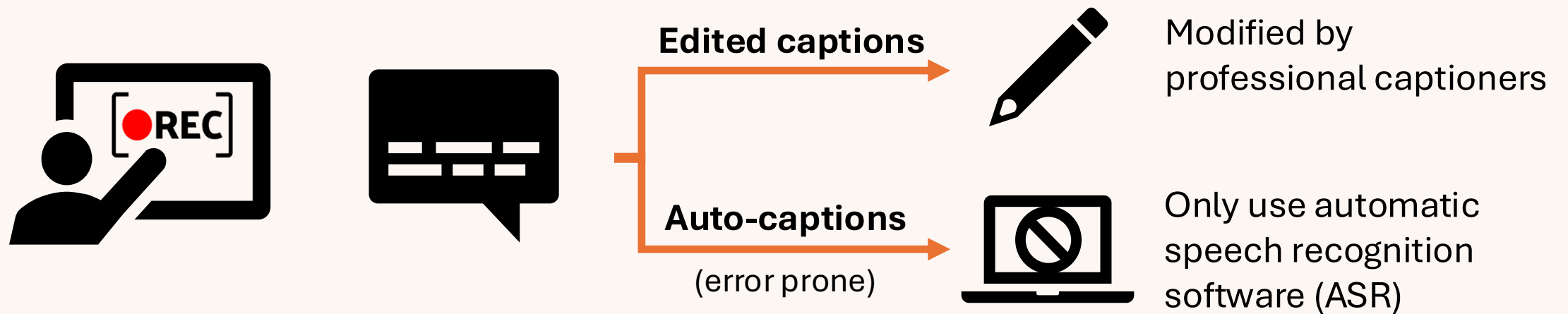


*What is the first disability subtype you think of when you think of captions?
How does it impact that group?*

Caption benefits for people with disabilities



But... caption type can also affect access



Auto-captions can be error prone

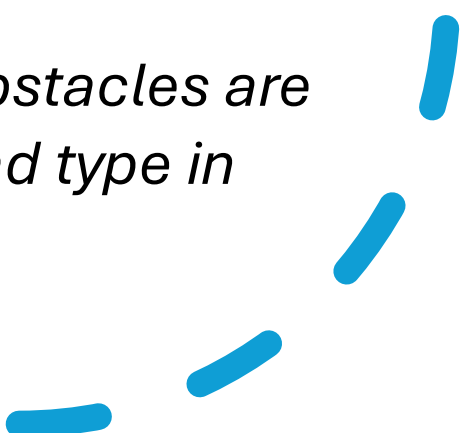
01

ASR less accurate for
Black and accented
speakers

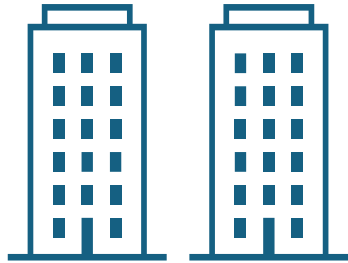
02

DHH cite accuracy
issues with real-time
auto-captions

Research questions

1. *What are the experiences and perspectives of SWD regarding captions on recorded lectures in STEM courses?*
 2. *What, if any, preferences do SWD have for automatic or edited captions? And what rationales do they offer for their caption preferences?*
 3. *What, if any, disability-specific obstacles are impacted by caption inclusion and type in STEM courses?*
- 

Interview recruitment



Two institutions



\$25 payment for
participation



Social model of disability

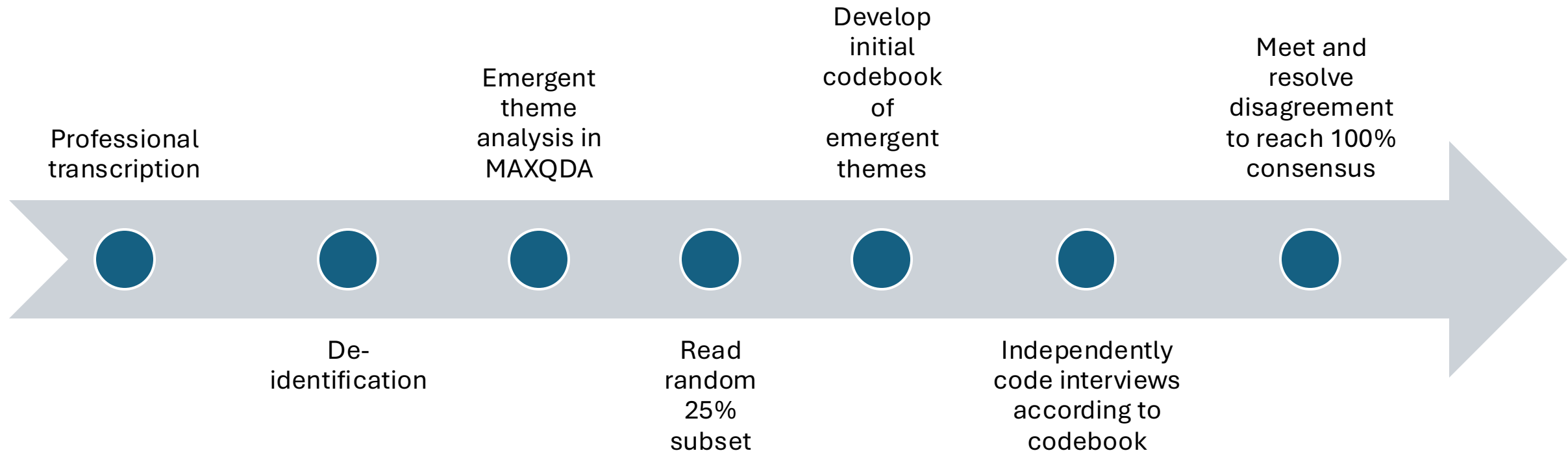
Interview recruitment

“Please note that self-diagnosis or medical diagnosis are both acceptable forms of identifying disability.”



Social model of disability

Interview data analysis



Participant demographics: disability subtype

Subtype	Students % (n)
Mental health or psychological disability	56% (14)
ADHD ¹	52% (13)
Learning disability ¹	36% (9)
Autism or sensory processing ¹	24% (6)
Chronic health condition	24% (6)
D/deaf or Hard-of-Hearing (DHOH)	20% (5)
Vision loss or impairment or blindness	8% (2)
Physical disability	4% (1)

¹Separation of ADHD, autism, and learning disability subtypes informed by the Individuals with Disabilities Education Act and confirmed in SWD think-alouds

Participant demographics

45.8%

PEER ($n = 11$)

70.8%

POC ($n = 17$)

36%

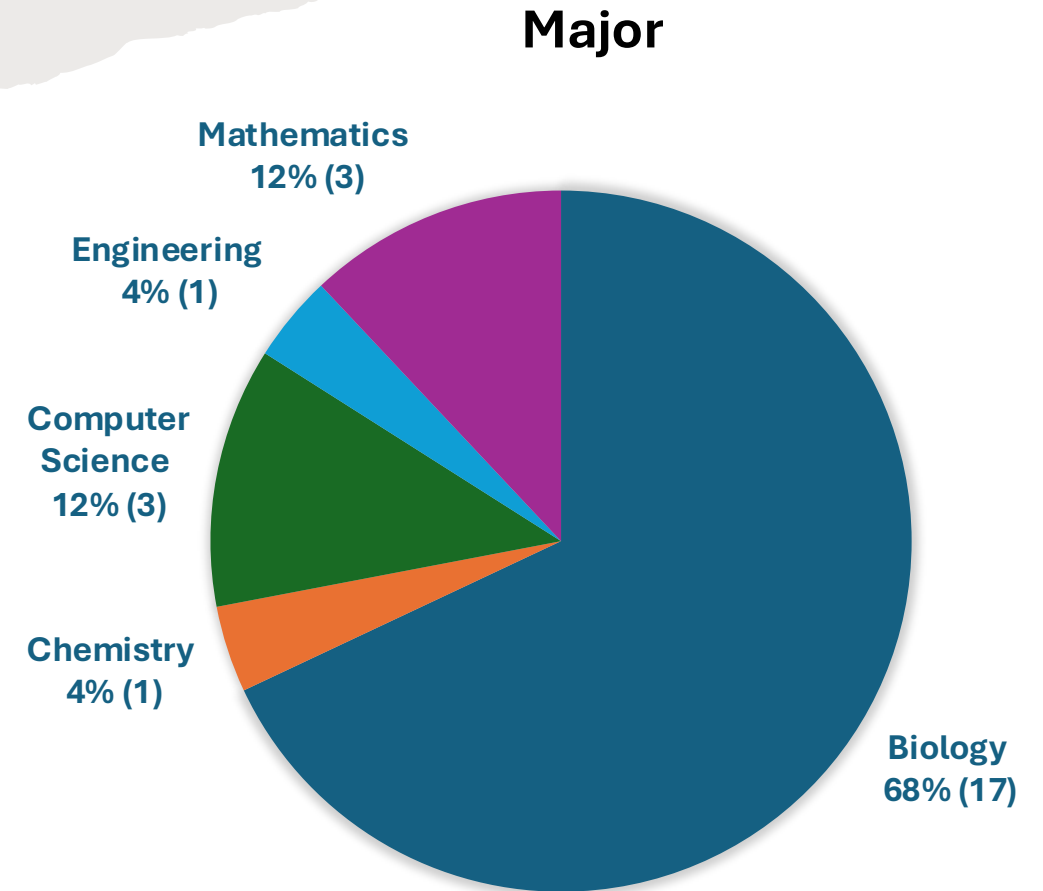
First-generation ($n = 9$)

48%

Low SES ($n = 12$)

28%

Non-binary/
genderqueer and/or
transgender ($n = 7$)



5 major themes

Caption
benefits and
multimodality

Auto-captions
create burden

Edited captions
support
learning

Missing captions
have negative
effects

Barriers to self-
advocacy

5 major themes

Caption
benefits and
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learning

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have negative
effects

Barriers to self-
advocacy

Errors in auto-captions created disability-related obstacles

Misrepresenting content/jargon

Creating gaps in knowledge
and distractions

Causing anxiety

Causing confusion with multimodal
conflicting streams of sensory input



SWD overall



Students with mental
health or psychological
disabilities



Students with working
memory limitations

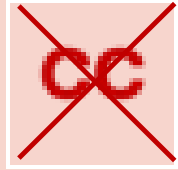
Auto-captions create burden

“Taking a physiology class ... [the auto-captions] would bleep out ‘penis’ or ... what it deemed inappropriate, which is not accessible to me because I’m like, ‘You bleeped out terminology that I needed to know.’ ... I was taking ... biochemistry during the pandemic, and again ... it didn’t capture [terminology]. It would take me longer to study because I’m just going back and reviewing the video because I’m trying to figure out what was being said, where for other students, they probably can just [go], ‘Oh, I understand.’ ... [but] I am Deaf since birth.”



Kamal (DHOH)

Responses to caption errors



Turn captions off



Rely on other sources: peers,
YouTube, (rarely) professors



Editing captions themselves

Auto-captions create burden

"I'm in math, so for example, oh my god, integral, [the captions] never knew what an integral was ... you kind of had to fill in the gaps, which is very difficult ... [with a] lot of Googling, a lot of tears ... You hear the first syllable most of the time, like 'in' for integrate ... and you would ... go on Google and be like, okay, 'I-N in calc'... And you would hope that Google could find it and, if not, you would also [text] your peers and be like, 'Hey, what was that thing we did with $3x - 4$?'"

Dakota (DHOH, mental health and/or psychological disability)



5 major themes

Caption
benefits and
multimodality

Auto-captions
create burden

Edited captions
support
learning

Missing captions
have negative
effects

Barriers to self-
advocacy

Edited captions maximize benefits and minimize burden

“Using the edited captions lets me dedicate that time that I would've spent figuring out what the captions meant, learning the material in other ways.”



Nuka (ADHD, chronic health condition, learning disability, mental health and/or psychological disability)

5 major themes

Caption
benefits and
multimodality

Auto-captions
create burden

Edited captions
support
learning

**Missing captions
have negative
effects**

Barriers to self-
advocacy

“Anything is better than nothing”

“[When I’m not given captions] ... it starts with skipping words or being confused ... Especially when I miss those keywords [in the] first few weeks, then it creates this butterfly effect of like, ‘Oh, because I missed that one sentence in that class, now I don’t understand what is happening in this whole class because ... that one sentence is really important’ ... And then it usually leads me to just sitting in the class having no idea what’s happening.”

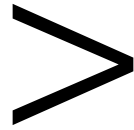


Alex (autism and/or sensory processing, ADHD, chronic health condition, learning disability, mental health and/or psychological disability)

Therefore, we recommend...



Edited
captions



Automatic
captions



No
captions

Institutions must have policy in place to provide these resources!

Why is it problematic to rely on formalized accommodations system?

What are some barriers students may encounter in navigating formalized accommodations?



Why is it problematic to rely on formalized accommodations system?

Why is it problematic to rely on formalized accommodations system?

Individualist model of disability

**SES, race,
or gender**

**Privacy or
stereotype
threat (stigma)**

**Barriers to
self-advocacy**



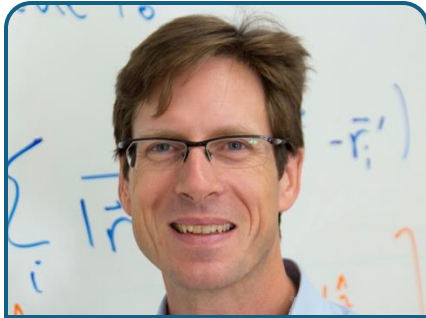
Acknowledgements



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Price



Dr. Darcy
Taniguchi



Participants



Recommendations for instructor-student rapport

Include
supportive
statements
on syllabi

Keep open lines of dialogue

Accommodate
students who self-
advocate

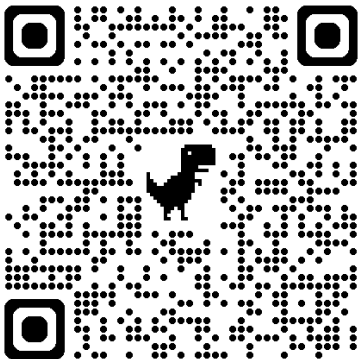
Collaborate with
DS on
accommodations


Check in

Solicit anonymous
feedback during
course

Proactively
encourage
students to ask
for help

*Sign up to be notified
when study results
are published!*





Recommendations for classroom design

*Sign up to be notified
when study results
are published!*

