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Understanding STEM Instructors' Experiences with and Perceptions of Deaf and Hard of Hearing Students: The First Step towards Increasing Access and Inclusivity

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**Understanding STEM Instructors' Experiences with and
Perceptions of Deaf and Hard of Hearing Students: The First
Step towards Increasing Access and Inclusivity**

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General Honors

Defense Date: Tuesday, April 14th, 2020

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Hearing Sciences

Abstract

Through an anonymous survey we analyzed Western Michigan University (WMU) STEM instructors' experience with and understanding of teaching and interacting with Deaf and Hard of Hearing (HoH) students. The goal of this study was to capture the experiences of WMU STEM instructors and the resources available to them given their direct impact on Deaf/HoH students' ability to succeed and receive a post-secondary education. The findings of this study support the claim that instructors are not well supported or aware of the needs of Deaf/HoH students, and do not have access to adequate resources to resolve the issue.

The first steps in order to invoke change are assessment of the situation, creating awareness, and educating others. Through deconstructing misconceptions of Deaf/HoH people, acknowledging the lack of representation of Deaf/HoH in STEM, and aiming to educate post-secondary instructors of their essential role in Deaf/HoH lives, we proposed Deaf/HoH students would be better supported and affirmed when the instructors are aware of their needs. Instructors who are educated on how to best support Deaf/HoH in academia positively impact Deaf/HoH people and their pursuit of post-secondary degrees. The long-term goals of this work are to build a confident community of educated advocates here at Western Michigan University (WMU) who are aware of the needs of Deaf/HoH students and are willing to educate others.

Introduction

When groups of people are excluded from post-secondary education and pursuing careers in STEM fields, the STEM community is limited in the ability to think critically and look at topics with interdisciplinary perspectives. Research has shown it is better to assemble a team of people with diverse cognitive strengths rather than a group of similar strengths because when difficult problems arise, diversity often “trumps ability” (1) – meaning diverse groups approach problems uniquely and create solutions in a more creative way. Therefore, to assemble an effective problem-solving team it is strategic to combine people of diverse backgrounds and talents.

Deaf and Hard of Hearing (HoH) people are severely underrepresented in STEM as they only constitute 0.13% – 0.19% of people with careers in STEM (2, 3). To mitigate the underrepresentation of Deaf and HoH in STEM, instructors must be aware of their immediate role in the success of Deaf and HoH students’ pursuit of post-secondary education. This study focused on experiences of STEM instructors at a mid-size, Midwestern, public university with Deaf and/or HoH students in their classrooms and their knowledge of instructional resources to meet the needs of this student population.

Background

Deaf people are a minority population across the globe and are poorly understood. Their uniqueness from the majority is a difference in communication and often utilization of a different language. Deaf people experience audism, discrimination based on hearing status, as a result of other peoples' lack of understanding of what it means to be Deaf; however, not all audism impacts the Deaf person in the same way. Bronfenbrenner's Multi-System Theory explains the interactions between multiple systems of influence on an individuals' life (4). When this theory is applied to the life of a Deaf person, there are distinct categories that highlight how barriers in

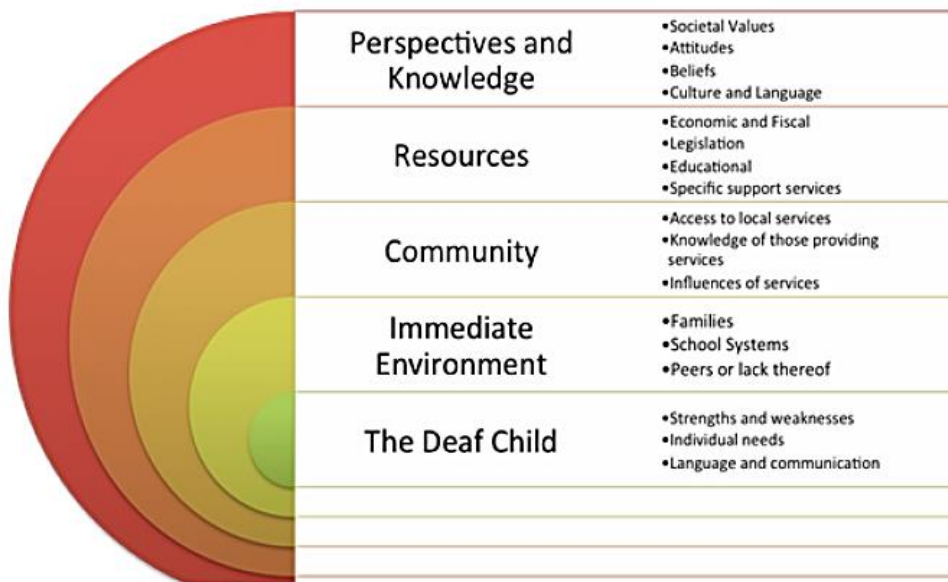


Figure 1 - Bronfenbrenner's Multi-System Theory

said categories have either greater or lesser potential to impact the individual (4). School systems, including teachers, mentors, and supervisors, are in the Deaf person's immediate environment, equivalent to the person's own family and close peers. The immediate environment is the closest an external factor can be to the individual which means it has the greatest potential to influence the person in a positive or negative way – more than any other external factor listed in community, resources, and perspectives and knowledge as noted in Figure 1. Thus, instructors

hold a vital role in a Deaf person's life. But in order to be a *positive* influence and better affirm and support Deaf students and their pursuits of post-secondary degrees, the instructors must first be aware and educated of the disparity facing Deaf students.

Deaf Minority Culture

Deaf and HoH people are a minority group in the U.S. as they constitute only 3% of the general population. 97% of the 350 million people in the U.S. are hearing and 3% (i.e. 10 million people) report having difficulty hearing (2). Deaf and HoH people also meet the criteria of a cultural minority group as defined by Charles Wagley and Marvin Harris in 1958 (2). Wagley and Harris state the five defining characteristics a group must possess in order to meet the cultural minority group criteria are:

1. Unequal treatment and less power over their lives – Deaf/HoH people are continually oppressed throughout their lives by lack of access to equal information when interpreters are not provided, captions are not included, and individuals make assumptions about their abilities based only on their hearing status
2. Distinguishing physical or cultural traits – Deaf/HoH people cannot hear or have difficulty hearing at a level that conflicts with hearing culture. Some Deaf/HoH have hearing aids, cochlear implants, or use American Sign Language (ASL) to communicate – all of which distinguish them from hearing culture.

3. Involuntary membership in the group – Deaf/HoH do not choose to be a member of this group. Some individuals are born with complete Deafness, born with some level of hearing loss, progressively acquire Deafness throughout their lives, become Deaf/HoH as a result of illness or traumatic injury, or become Deaf/HoH as a result of ototoxic drugs.
4. Awareness of subordination – Deaf/HoH people are aware of their status difference which contrasts the majority of hearing people as it is evident in varying methods of communication, different cultural tendencies, needing additional accommodations for daily tasks, and difference of physical ability to hear.
5. High rate of in-group marriage – Of Deaf/HoH people who marry, 90% of those people marry other Deaf people (6).

Those who choose to identify with the above characteristics and feel that being Deaf is a part of who they are use a capital ‘D’ for the word Deaf instead of a lower case ‘d’. Although this is a small change, it holds great value in Deaf culture because it is an attempt to stray from lower case ‘deaf’ or ‘deafness’ which is commonly used in the medical field and scientific literature as a disability or illness that needs to be corrected.

Deaf Identity and Common Misconceptions

Because people who report difficulty hearing only constitute 3% of the U.S. population, it is easy for the general hearing population to dismiss this minority and overlook that this group is comprised of 10 million capable individuals. These individuals are unique in their identity of

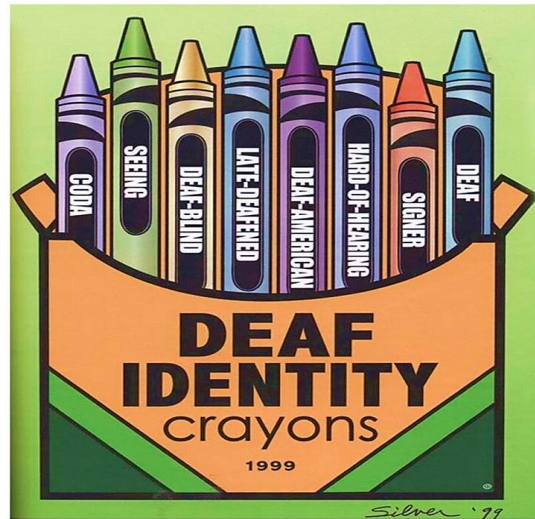


Figure 2 - Deaf Identity Crayons by Ann Silver.

what it means to either be Deaf or HoH. Ann Silver, a renowned American Deaf artist, depicts the variability of Deaf identity and calls her piece *Deaf Identity Crayons* (Figure 2). As a result of the high variability amongst this group of people, there are numerous misconceptions the general population have about Deaf and HoH people. Below are common misconceptions the general population have, followed by explanations and a progressive deconstruction as to why they are incorrect:

Misconceptions

- All Deaf/HoH people want to hear
- Most Deaf/HoH people are born to Deaf/HoH parents
- All Deaf/HoH people know sign language
- American Sign Language (ASL) is English on the hands
- Deaf/HoH people with hearing aids or cochlear implants can hear/understand speech intelligibly
- Most Deaf/HoH people can read lips

Explaining the misconceptions

- All Deaf/HoH people want to hear: Not all Deaf/HoH people want to hear. Many Deaf people see their Deafness as an integral component of their identity. Those who identify with Deaf minority culture find a sense of community within the group as other people share similar stories/experiences of oppression, face similar daily obstacles, and feel as though their identities and lives do not align with those of the hearing community.
- Most Deaf/HoH people are born to Deaf/HoH parents: People assume that Deaf people come from Deaf parents; however, 90% of Deaf/HoH children are born to hearing parents (7). It should not be assumed that Deaf people have family members who are also Deaf.
- All Deaf/HoH people know sign language: In congruence with the misconception above, because 90% of Deaf/HoH children are born to hearing parents (7), Deaf/HoH are not always provided with the opportunity to learn American Sign Language (ASL). In the U.S. there is a hypocritical construct that teaching hearing babies ASL is considered practical for the child to communicate their needs before they're able to learn spoken language, and this process is idolized and praised. However, when a baby is found to be Deaf or have some level of hearing loss, medical intervention is highly recommended and the parents often construct treatment plans with physicians to utilize assistive technology and immerse the child in oral programs, rather than teaching them ASL.
- American Sign Language (ASL) is English on the hands: ASL is a unique language of its own with starkly different characteristics from English. Firstly, ASL is a manual

language without speech. It is important to note that a language does not need to be verbalized in order to communicate meaning in its own way or in order to be classified as a *true* language – think of written language, which communicates meaning without being spoken. ASL is both expressive and receptive. When Person A is signing to Person B, Person A is expressing themselves and Person B is watching to retain and receive what Person A is communicating – this has no fundamental difference between speaking and listening. Additionally, ASL has its own form, content, and use (8). **Form** details the structure of language (8). For spoken English, form is the sounds that make up words, but for ASL it can be things like mouth or facial morphemes – for example, when the mouth changes from ‘ooo’ to ‘aaa’ shape it indicates something grew in size, or furrowing eye brows asks a question which necessitates a response, but raising eye brows asks a yes/no or rhetorical question. **Content** focuses on the meaning of the language (8). For spoken English, content is the meaning of words and how different meanings are created when linked together in different ways – the same can be said for ASL except spoken words are replaced with ASL signs. **Use** defines the pragmatics of a language which includes how language adapts based on social rules and conversations with varying audiences (8), which varies amongst spoken English and signed ASL.

- Deaf/HoH people with hearing aids or cochlear implants can hear/understand speech intelligibly: At typical auditory baseline, individuals are capable of hearing a vast spectrum of sounds ranging from the faint rustling of leaves to a roaring jet engine miles overhead. A sound wave is unique and distinguishable from other sounds based on its volume/loudness which is measured in decibels, and the pitch/frequency which is

measured in Hertz. During a hearing test the administrator will test the subject's ability to hear sounds of both low to high volume and pitch. The results of the test are recorded on a chart known as an audiogram. Hearing status among Deaf and HoH is unique to each individual so hearing test results recorded on an audiogram are also quite variable; however, most Deaf/HoH without assistive technology score in the lower portion of the audiogram meaning they are only able to hear louder sounds at certain frequencies. When Deaf/HoH are retested with assistive technology, they score higher than they did at baseline without the technology. It is essential to note that using hearing aids or cochlear implants does not fully restore hearing to the level a majority of the population are used

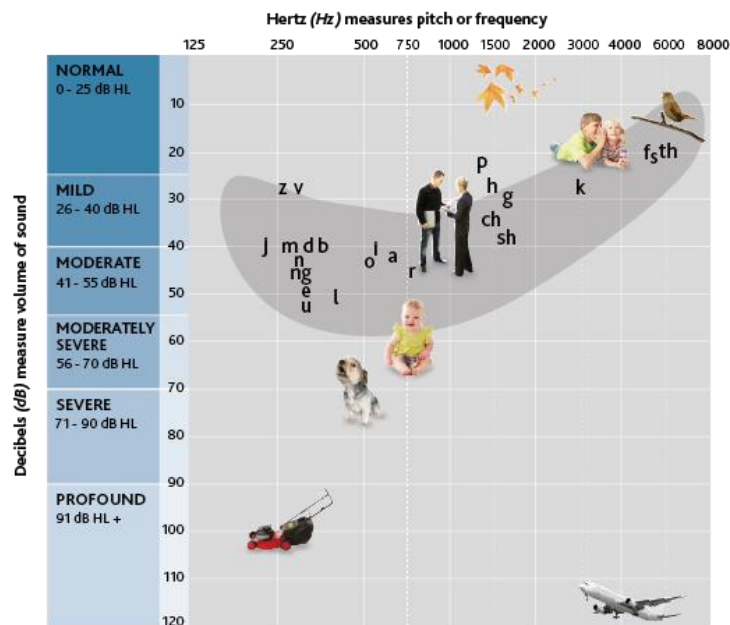


Figure 3 – Audiogram with commonly recognized sounds placed at their correct volume and frequency.

to – rather, it might change a Deaf/HoH person from hearing a plane over head to hearing a dog barking or someone yelling. Noted in the gray shaded area of Figure 3, is where English language speech sounds and letters occur on an audiogram. Recall that the use of hearing aids and cochlear implants do not restore an individual's hearing, rather it only improves it from its previous status. Speech sounds are much softer sounds with a range

of potential frequencies and just because an individual uses hearing aids or cochlear implants does not mean that they will be able to hear spoken language or understand it intelligibly. Of the 10 million Americans who identify as having difficulty hearing, 464,000–1,000,000 of those people report difficulty hearing normal conversation even with auditory assistance (9).

- Most Deaf/HoH people can read lips: Lipreading is more appropriately known as speechreading because it is more than just analyzing the lips, it is also understanding the conversation topic, subject matter, analyzing the face, body movements, gestures, and other forms of expression – thus the well-known “lipreading” will be referred to as “speechreading.” In the English language, 40-50% of speech sounds are not visible on the lips – for example sounds such as *k*, *g*, *h* (7). To put in perspective, if you were listening to your friend tell you a story, this would be equivalent to only hearing every other word but you still try to follow along and figure out what the story means – that would be difficult! Secondly, in order to benefit from speechreading, the individual must understand the context/subject matter and have extensive background in the language so they can fill in the gaps with more information. This is very problematic in an education setting because the individual is learning about new information and unfamiliar topics so it is unrealistic to assume a student would have all vocabulary needed in the subject matter before learning about the subject itself. Lastly, there are many other factors that inhibit the logistics of someone’s ability to speech-read such as the following: poor lighting, facial hair, physical obstructions, volume of the speaker, tone of voice, voice

inflection, and foreign accents. It should not be assumed that a Deaf/HoH person can speech-read.

Personal Stories

When misconceptions about a minority culture are not deconstructed it leads to discrimination and oppression. When Deaf/HoH are not understood it leads to *audism*, which is discrimination based on hearing status (6). Regardless of whether someone acted intentionally or unintentionally, oppressive acts towards Deaf/HoH can have long-lasting negative impacts on them. Below are stories from three different students who experienced audism while in post-secondary educational settings:

“I have a cochlear implant and hearing aid. I went to class to take my first exam along with my classmates. During the exam, the professor approached me and demanded I remove my ‘headphones’. I explained they were my cochlear implant and hearing aid. The professor continued to demand I remove my ‘headphones’ and started speaking even louder and drawing attention. The professor said, ‘*You can’t use technology during exams,*’ I eventually just took them off.”

“I was in graduate school doing research. My research group would change dates and times of lab meetings and other important gatherings but they never thought of me. They wouldn’t get an interpreter for me. I had to either stop what I was doing and put my own things aside to reschedule an interpreter, or just not go to the meeting and still miss out on important things. I had access to interpreters but their actions still limited my education.”

“There were several professors who I’ve had to struggle with outside of class because they continued to state that I couldn’t have an interpreter present whenever there was a quiz or exam because they accused that as cheating. What if I had a

question to ask the professor? They would think the interpreter would tell me the answer. Those professors didn't understand.”

The common theme present in all three stories is that all three students had “access” to the information via cochlear implant, hearing aid, or ASL interpreter, but their education and academic experience was still negatively impacted by the instructors’ or group members’ lack of understanding. These students’ stories are incredibly valuable and significant, but they are unfortunately not unique. Audism is not just a definition. Deaf people are not just statistics or a diagnosis of supposed deficiency. Oppressive acts by instructors and other academic personnel, whether intentional or unintentional, happen daily and each act can have a negative and long-lasting impact on Deaf people which deters them from pursuing post-secondary education.

Underrepresentation of Deaf

Deaf and Hard of Hearing (HoH) people are severely underrepresented in STEM as they only constitute 0.13% – 0.19% of people with careers in STEM, compared to hearing people which constitute 11 – 15.3% (2, 3). This underrepresentation is a direct result of Deaf/HoH people enrolling in post-secondary education having high no completion rates. 68% of hearing high school graduates enroll in post-secondary education and 40% of those people graduate; however 60% of Deaf/HoH high school graduates enroll in post-secondary education but only 23% of those people graduate (2, 3, 10). Although Deaf/HoH people are a minority in the U.S., they still represent 3% of the U.S. population which is equivalent to 10 million people – therefore, there are millions of capable individuals who are capable of increasing diversity of the STEM field if they were well supported by post-secondary instructors.

Methods

Human Subjects Institutional Review Board (HSIRB) consent was obtained for the project. An anonymous survey was created using Qualtrics, a secure online survey platform. Through email, instructors, defined as any individual who holds a teaching role at WMU including undergraduate teachings assistants, graduate teaching assistants, professors both tenure-track and not tenure-track, and faculty specialists, from all Western Michigan University (WMU) STEM departments were asked to participate in the survey. Each departmental administrative assistant was contacted and asked to distribute the recruitment email and survey link to instructors in their department. In total, approximately 300 individuals were contacted and asked to participate in the survey. 73 instructors participated in the study, for a response rate of approximately 25%. Efforts to improve response rates included email reminders, announcements at faculty meetings, and an incentive for participation (\$25 gift card sent to eight randomly select participants). Prior to taking the survey, participants expressed understanding of the anonymous consent disclaimer, and consented to being a participant in the study.

After providing consent, participants were directed to the survey. Detailed below is a complete copy of all questions asked in the survey. Based on participants' answers to the first question (Q1), they were given two different sets of questions – thus the reasoning for two separate columns of questions. All demographic questions were asked to all participants regardless of their response to the first question. The survey was open for two months to allow participants time to respond.

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Q1. Have you ever been aware of having a Deaf or Hard of Hearing (HoH) student in your class?

- Yes
- No

Q1 “YES”	Q1 “NO”
<p>Of students who identified as Deaf/Hard of Hearing (HoH), what method(s) did the student use for accommodation? (Select all that apply)</p> <ul style="list-style-type: none"> - Instructor to wear a microphone - Real time captioning software - Close spatial positioning to the instructor for lip reading - American Sign Language (ASL) interpreter - Method not specified: 	<p>To your knowledge, have you ever met or interacted with an individual who identifies as Deaf or Hard of Hearing (HoH)?</p> <ul style="list-style-type: none"> - Yes - No
<p>Did you feel adequately prepared to communicate with your Deaf/HoH student?</p> <ul style="list-style-type: none"> - Yes - No 	<p>To your knowledge, have you ever met or interacted with an individual who identifies as Deaf or Hard of Hearing (HoH) here at Western Michigan University?</p> <ul style="list-style-type: none"> - Yes - No
<p>Throughout the semester, what was your main method of communication with your Deaf/HoH student?</p> <ul style="list-style-type: none"> - ASL Interpreter - Email - Writing/typing notes back and forth - Speaking - Method not specified: 	<p>Would you feel adequately prepared to communicate with Deaf/HoH students in your class?</p> <ul style="list-style-type: none"> - Yes - No
<p>As an instructor, are you aware of the resources made available to you by WMU to aid in teaching Deaf/HoH students?</p> <ul style="list-style-type: none"> - Yes - No 	<p>As an instructor, are you aware of the resources made available to you by WMU to aid in teaching a Deaf/HoH student?</p> <ul style="list-style-type: none"> - Yes - No
<p>As an instructor, did you know what changes to make to your lecture materials to make them more accessible to Deaf/HoH students?</p> <ul style="list-style-type: none"> - Yes, please provide examples: _____ - No 	<p>As an instructor, would you know what changes to make to your lecture materials to make them more accessible to Deaf/HoH students?</p> <ul style="list-style-type: none"> - Yes, please provide examples: _____ - No
<p>*If answered yes, where on campus provides assistance to make these changes?</p>	<p>*If answered yes, where on campus provides assistance to make these changes?</p>
<p>*If answered no, where on campus would you go to learn about making your materials more accessible?</p>	<p>*If answered no, where on campus would you go to learn about making your materials more accessible?</p>
<p>Do you agree or disagree with the following statement: Deaf/Hard of Hearing (HoH) students have access to adequate resources to earn a post-secondary degree in STEM fields.</p> <ul style="list-style-type: none"> - Agree - Disagree 	<p>Do you agree or disagree with the following statement: Deaf/Hard of Hearing (HoH) students have access to adequate resources to earn a post-secondary degree in STEM fields.</p> <ul style="list-style-type: none"> - Agree - Disagree

<p>Do you agree or disagree with the following statement: Deaf/Hard of Hearing (HoH) students are intellectually capable of earning a post-secondary degree in STEM fields.</p> <ul style="list-style-type: none"> - Agree - Disagree 	<p>Do you agree or disagree with the following statement: Deaf/Hard of Hearing (HoH) students are intellectually capable of earning a post-secondary degree in STEM fields.</p> <ul style="list-style-type: none"> - Agree - Disagree
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Demographics

What bracket best defines your age?

- 18 – 23
- 24 – 29
- 30 – 35
- 36 – 41
- 42 – 47
- 48 – 53
- 54 – 59
- 60 – 65
- 66 – 71
- 72 – 77
- 78 – 83
- 84 – 89

What best describes your role here at WMU?

- Teaching Assistant
- Professor (tenure-track or tenured)
- Instructor (not tenure-track)
- Faculty specialist

What WMU departments do you associate with? (Mark all that apply)

- Anthropology
- Biological Sciences
- Chemical and Paper Engineering
- Chemistry
- Civil and Construction Engineering
- Computer Science
- Electrical and Computer Engineering
- Engineering Design, Manufacturing and Management Systems
- Environment and Sustainability
- Geography
- Geological and Environmental Sciences
- Industrial and Entrepreneurial Engineering and Engineering Management
- Mathematics
- Mechanical and Aerospace Engineering
- Physics
- Psychology
- Statistics

With which racial and ethnic group(s) do you identify? (Mark all that apply)

- American Indian or Alaska Native
- Hispanic, Latino, or Spanish origin
- White
- Asian
- Middle Eastern or North African
- Black or African American
- Native Hawaiian or Other Pacific Islander

What is your country of origin?

- *All countries listed*

How do you describe your gender identity? (Mark all that apply)

- Woman
- Man
- Genderqueer
- Agender
- Transgender
- Cisgender
- A gender not listed: _____
- Prefer not to disclose

How do you describe your sexual identity? (Mark all that apply)

- Heterosexual/straight
- Homosexual/gay/lesbian
- Bisexual
- Asexual
- A sexuality not listed: _____
- Prefer not to disclose

How do you describe your disability / ability status? We are interested in this identification regardless of whether you typically request accommodations for this disability. (Mark all that apply)

- A sensory condition (e.g., vision loss, hearing loss)
- A learning condition (e.g., ADHD, dyslexia)
- A long-term medical illness (e.g., epilepsy, cystic fibrosis)
- A mobility/physical condition (e.g., walking/climbing stairs, opening doors)
- A mental health condition (e.g., anxiety, depression, bipolar)
- A disability or impairment not listed above: _____
- Prefer not to disclose
- I do not identify with any of the disability / ability options above

Analysis

Once the survey was closed all responses were exported to Microsoft Excel. Because participants were provided a specific set of questions dependent on their response to the first survey question (Q1), the responses were sorted into two groups – those who responded ‘Yes’ or ‘No’ to Q1. Once sorted, the following questions were analyzed and the responses of participants from ‘Yes’ and ‘No’ groups were compared. These questions were selected for analysis as they provided the most relevant data to include in the overall discussion.

- Did you feel (or would you feel) adequately prepared to communicate with your Deaf/HoH student?
- As an instructor, are you aware of the resources made available to you by WMU to aide in teaching Deaf/HoH students?
- Do you agree or disagree with the following statement: Deaf/HoH students have access to adequate resources to earn a post-secondary degree in STEM fields?
- Do you agree or disagree with the following statement: Deaf/HoH students are intellectually capable of earning a post-secondary degree in STEM fields?

- As an instructor, did you know what changes (or would you know what changes) to make to your lecture materials to make them more accessible to Deaf/HoH students?

Results

73 instructors participated in the study. Q1 asked, “Have you ever been aware of having a Deaf/HoH student in your class?” found that 75% of participants (55/75 people) have never been aware of instructing a Deaf/HoH student (Figure 4). As detailed above in Methods, the response of ‘Yes’ or ‘No’ to Q1 determined the set of questions the participants received. The following images represent the results of the study. ‘Yes’ group in response to Q1 is colored green and ‘No’ group in response to Q1 is colored blue.

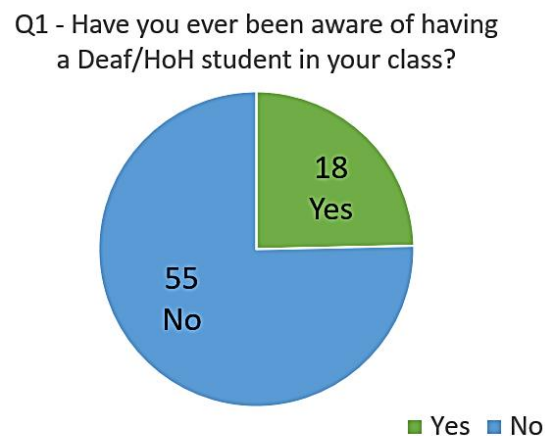
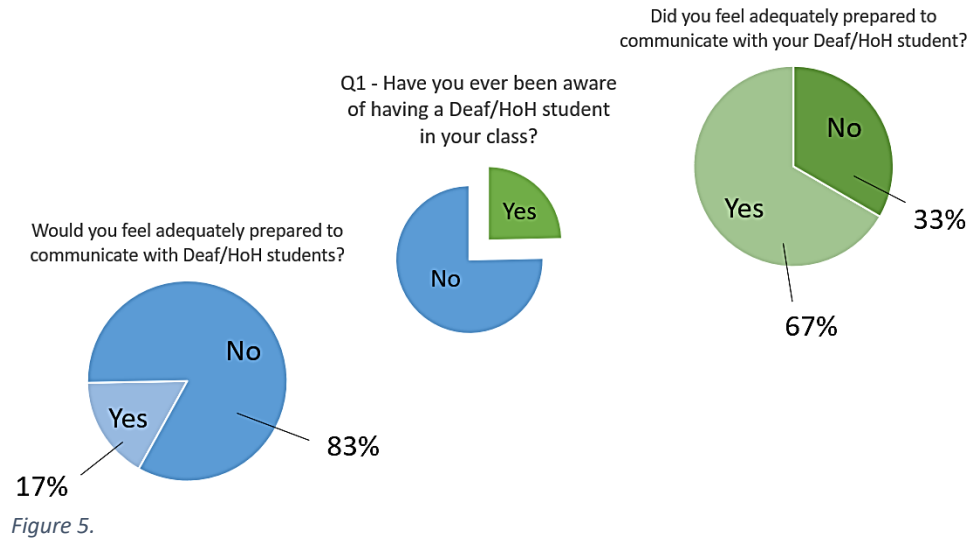
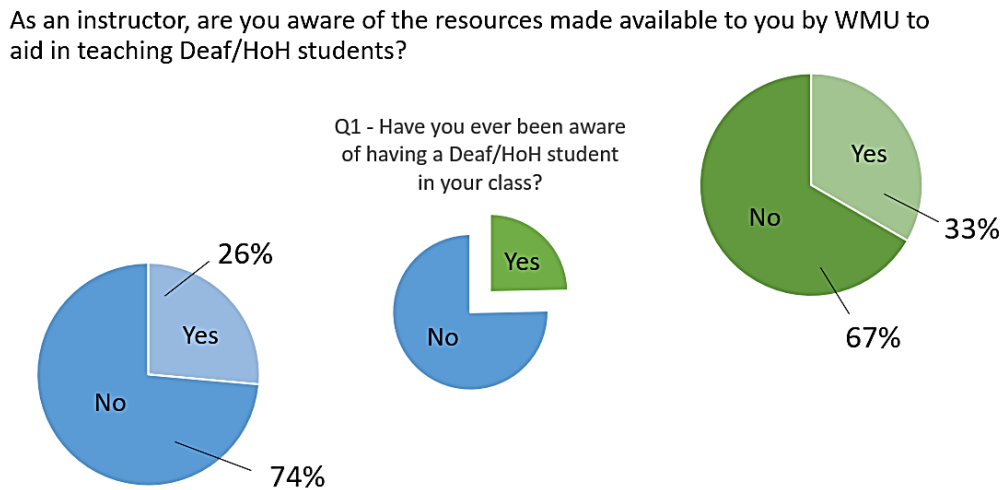


Figure 4.

Instructors were asked to reflect on their level of preparedness to communicate with a Deaf/HoH student – although the questions were worded differently to respect the groups’ answers to Q1, the question targeted the same understanding. 67% of ‘Yes’ participants who had previous experience instructing a Deaf/HoH student, and 83% of ‘No’ participants who had no previous experience instructing a Deaf/HoH student stated they would not, or were not, prepared to communicate with the student (Figure 5).



Instructors were asked whether they were aware of the resources available to them by WMU to aid in teaching Deaf/HoH students. 67% of ‘Yes’ participants who had previous experience instructing a Deaf/HoH student, and 74% of ‘No’ participants who had no previous experience instructing a Deaf/HoH student stated they are not aware of the resources available to them from the university (Figure 6).



Instructors were asked to either agree or disagree with two statements provided to them. The first agree/disagree question asked instructors whether they thought Deaf/HoH students have access to adequate resources to earn post-secondary degrees in STEM fields. In total, 11 people chose not to respond to this question. Of the 62 people who responded, the majority of participants agreed with this statement regardless of whether they have, or have not, had experience instructing Deaf/HoH students (Figure 7). The second agree/disagree question asked instructors whether they thought Deaf/HoH students are intellectually capable of earning post-secondary degrees in STEM fields. Four people chose not to respond to this question, but of the 69 individuals who did respond to this question, 100% of participants agreed that Deaf/HoH students are intellectually capable.

Do you agree or disagree with the following statement: **Deaf/Hard of Hearing (HoH) students have access to adequate resources to earn a post-secondary degree in STEM fields.**

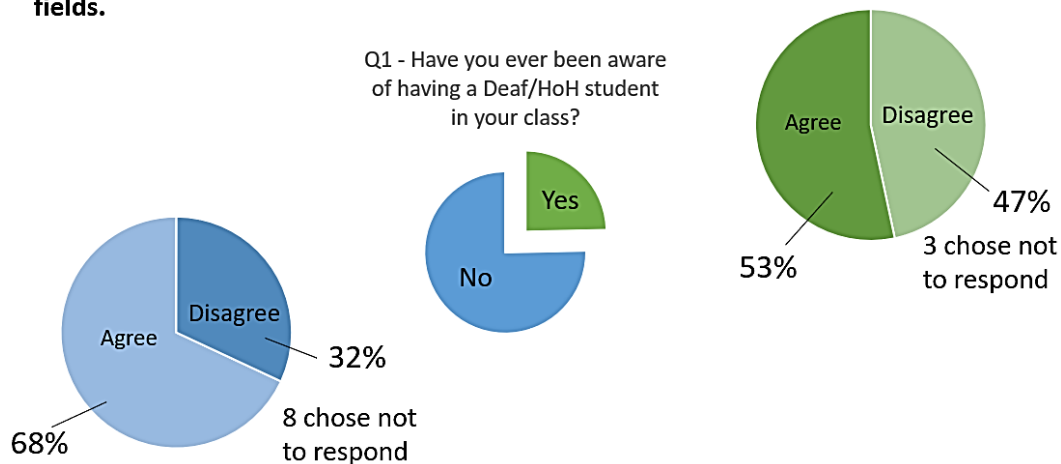


Figure 7.

Instructors of both 'Yes' and 'No' groups were asked whether they did, or would, know what changes to make to their lecture materials to make them more accessible to Deaf/HoH students. In addition to this question, they were also asked where on campus they could go to learn about making their materials more accessible. Regardless of the participants' experience or

lack thereof of instructing a Deaf/HoH student, 92% of all participants responded either “I don’t know” or “Disability Student Services (DSS).”

Summarized Results

- 75% of all participants have never experienced teaching Deaf/HoH students
- 70% of all participants did not, or would not, feel prepared to communicate with a Deaf/HoH student
- 72% of all participants were not aware of the resources made available to them by WMU
- 63% of participants agreed that Deaf/HoH have “access to adequate resources to pursue a post-secondary degree”
- 92% of all participants responded either “DSS” or “I don’t know” when asked how they would respond and seek help for having a Deaf/HoH student

Discussion

To their knowledge, 75% of all instructors have never taught a Deaf/HoH student and 70% of all instructors lack confidence in their ability to communicate with a Deaf/HoH student. The result of many instructors lacking experience and thus understanding of this minority group correlates with the unfortunate expectation that the hearing majority do not understand Deaf/HoH people. Therefore, it is important to raise awareness of this topic so when an instructor does encounter a Deaf/HoH student they feel prepared to instruct the student at the same confidence level of other students and know where to find additional resources and support from the university. For instructors, there is likely benefit to sparking this dialogue prior to ever

encountering a Deaf/HoH so that they are aware of how to intentionally avoid audism and how to most effectively, and positively, influence the students' academics.

Regardless of previous experience or lack of experience with a Deaf/HoH student, 72% of all participants were not aware of the resources made available to them by WMU, and 92% of all participants regardless of experience or lack of experience with Deaf/HoH students responded either "DSS" or "I don't know" when asked how they would respond and seek help for having a Deaf/HoH student. The response of "I don't know" is problematic because it is clear instructors lack understanding of what the Deaf/HoH student needs, and lack understanding of what to do for the student in order to be an impactful instructor. The response of "DSS" is also problematic because DSS advocates for students to be provided with necessary tools and accommodations needed for them to reach success and their full potential. At its core, DSS is designed for students and not for instructors. DSS is a resource for students who need additional accommodations to be successful which are outside instructors' capabilities. At baseline, DSS operates on a strategy of limited resources; therefore, when instructors seek supplemental help from DSS on a topic similar to Deaf/HoH inclusivity, DSS is not equipped to provide instructors impactful resources. Additionally, when DSS does use its resources such as time and staff to assist instructors, it takes away from students receiving needed services and support.

As DSS is not equipped or designed to educate instructors a shift is needed to instead use WMU's Office of Faculty Development (OFD). OFD strives to promote student success through faculty growth in the form of workshops and well-established resources and points-of-contact for instructors. The OFD used to be more focused on teaching instructors how to effectively use technology in the classroom and make their lectures more engaging, however, they have made a large shift to also include workshops about more inclusive topics. The OFD now offers

workshops that help instructors deconstruct their implicit biases, privilege, power, and focus on how they can be more universal instructors. The topic of increasing inclusivity and success of Deaf/HoH students naturally aligns with the focuses of OFD as it benefits the students through the education of instructors. To remedy this problem, it would be beneficial to develop a workshop which educates all instructors at a university on the meaning and value of Deaf identity, common misconceptions, and how they can positively contribute in the students' pursuits of higher education. The framework, faculty, and resources are already in place at the OFD so it would be a strategic resource to collaborate with when creating a workshop tailored for this minority group. Of high importance, it is essential when creating workshops for Deaf/HoH students that the workshops are also created *by* Deaf/HoH students. There is no better perspective or resource than students and instructors who are Deaf/HoH themselves.

Lastly, resources are needed beyond workshops in the form of accessible resources for instructors at all times. As previously discussed, instructors tend to look towards DSS for resources and advice but often result in little to no assistance. To avoid instructors stopping at this point and not receiving resources, it is necessary to establish links to redirect the seeking instructor from DSS to OFD where they can then find further information about workshops, those who lead the workshops that they could consult, and other resources available to them.

Conclusions

When groups of people are excluded from post-secondary education and pursuing careers in STEM fields, the STEM community is limited in the ability to think critically and look at topics with interdisciplinary perspectives. To assemble an effective problem-solving team it is strategic to combine people of diverse backgrounds and talents which should include Deaf/HoH

people. Through deconstructing misconceptions, acknowledging the lack of representation of Deaf/HoH in STEM, and aiming to educate post-secondary instructors of their essential role in Deaf/HoH lives, Deaf/HoH students would be better supported and affirmed in academia and their pursuit of post-secondary degrees. The long-term goals of this work are to build a confident community of educated advocates here at WMU who are aware of the needs of Deaf/HoH students and are willing to educate others to further diversify the university in a universally inclusive manner.

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