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Facilitating Equitable Access to Communication for Deaf and Hard of Hearing College Students in Online Learning Environments

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Abstract

This qualitative, descriptive study explored the experiences of college students with Deaf, deaf, and Hard of Hearing (D/d/HH) hearing difficulties within online learning environments (OLEs). This study used an inclusive and equitable theoretical framework of connectivism to address audism and the marginalization of college students with D/d/HH. The LIFE-R section's *After LIFE* semi-structured interview protocol collected data from 15 college students with hearing difficulties in OLEs recruited from the National Deaf Center-Listserve. The 12 themes highlighted that without extrinsic support, participants perceived inequitable accessibility of technology, hearing devices, or resources. In closing the research gap, the study's findings indicated that 1) college students with D/d/HH were underrepresented, had unique hearing differences, and needed consistent access to hearing assistance technology and resources; 2) connectivism extrinsic support: Provided equitable accessibility and a positive impact on self-advocacy and autonomy, engagement and emotions, and availability and effectiveness of technology-assisted hearing devices or resources, and 3) Audism: Provided inequitable accessibility and a negative impact on self-advocacy and autonomy to utilize technology hearing devices or resources, engagement, and emotions (i.e., frustration, anger, alienation, and isolation). The recommendations for improving accessible and effective technology hearing devices or resources utilizing a connectivism framework, implementing policies, best practices, professional development, and training. Future studies should explore students with difficulties hearing in OLEs without a medical diagnosis, intersectional identities, and larger sample sizes.

Keywords: *Audism, accessibility, Deaf, deaf, Hard of Hearing (D/d/HH), online learning, college, connectivism*

Facilitating Equitable Access to Communication for Deaf and Hard of Hearing College Students in Online Learning Environments

Effective communication in Online Learning Environments (OLE) is essential for equitable access for D/d/HH (Deaf, deaf, and hard of hearing) students. Access to communication is required under the Americans with Disabilities Act of 1990 (American Disabilities Act [ADA], 2023). Equitable accessibility is further supported by the Individuals with Disabilities Education Improvement Act of 2004 (Individual with Disabilities Education Act [IDEA] and Section 504 of the Rehabilitation Act (King & Piotrowski, 2021). Despite these protections, however, students who are D/d/HH frequently experience hearing challenges in OLEs. College students who are D/d/HH and access their learning primarily in OLEs are often not provided with the hearing assistance technology or resources needed for academic success (Butler, 2019; Counselman et al., 2020). These challenges for students have intensified since the increase in the use of OLEs resulting from the COVID-19 pandemic (Gin et al., 2021).

Students' accessibility to communication varies by context and individual circumstances, resulting from unique hearing perspectives. However, ADA accommodations are often provided to students with D/d/HH based on a medical diagnosis overlooking one’s unique hearing, unintentionally fostering biases towards students within OLE (Counselman et al., 2020; Ed.gov., 2021). Thus, individuals with unique hearing difficulties without a diagnosis may also benefit from ADA accommodations.

Without equitable access to accommodations within OLEs communication, many unrepresented students with various individual hearing needs might be denied their civil and educational rights to utilize technology-assisted hearing devices or resources (Federal Communication Commissioner [FCC], 2021). Hence, millions of dollars of funding are spent on

repairs and improvements in colleges' infrastructure, ignoring the technology required for students with D/d/HH accessibility to communication (National Association of the Deaf [NAD], 2022). This qualitative descriptive study explored the experiences of college students with D/d/HH regarding their access to communication being met in OLEs.

The theoretical frameworks of audism and connectivism were used in this study to understand students' experiences better and consider ways to shift the paradigm by supporting students with D/d/HH in OLEs. The seminal works of Lane (1992) and Humphries (1977) explained audism as the belief that the privilege of being able to hear promotes intellectual inferiority, oppression, and the dehumanization of the D/d/HH population (Alahasawi, 2016; Eckert & Rowley, 2013; Humphries, 1977; Lane, 1977; O'Connell, 2021). This up-to-date descriptive study is known to be one of the first in the literature to challenge and protest audism utilizing a connectivism theoretical framework. In this case, Siemens (2004) proposed that technology improves learning within digital online networks (Dennis, 2020; Siemens, 2004).

LaChapelle's (2023) study addressed the problem that college students with hearing difficulties needed consistent access to hearing assistance technology and resources in OLEs. The theoretical framework of connectivism is a new paradigm shift in the digital age of online technology to overcome audism towards the D/d/HH student populations. The four research questions explored how college students with D/d/HH (a) describe their hearing experiences with communication within the OLEs, (b) identify the technology-assisted hearing devices or resources that could be used to improve access to communication and learning within the OLEs, (c) identify the technology-assisted hearing devices or resources that were unsupportive and what could be used to improve access to communication and learning within the OLEs, and (d) the fourth explored how college students with D/d/HH's characteristics were identified.

Literature Review

There is no *one-size-fits-all* approach to helping students with D/d/HH access to communication, with unique hearing difficulties varying by context and individual circumstances (Alsalamah, 2020; Butler, 2019; Counselman et al., 2020; Garberoglio et al., 2022; Lynn et al., 2017, p.194). Counselman et al. (2020) could not recommend any specific theory or best practices for online practices for D/d/HH student populations' access to communication. The theoretical frameworks of audism and connectivism can provide a foundation for understanding why students with D/d/HH lack access to communication within OLEs (audism) and theoretical framework recommendations regarding using technology-assisted hearing devices or resources (connectivism) to improve equitable access to communication within OLEs.

Audism

The seminal works of Lane (1992) and Humphries (1977) demonstrated that the D/d/HH population has the same set of standards and modes of communication as hearing adults. As noted, Eckert and Rowley (2013) presented that audism was a systemic issue; thus, the hearing population had to take part in developing ethical citizenship solutions and admit that audism still exists today. Social scientists compared audism to results that were already widely recognized in the literature on the detrimental consequences of racism with Critical Race Theory and Critical Deaf Theory and similarities between racism and audism to offer solutions to this systemic problem of audism (Connor et al., 2021; Stapleton, 2016).

Connectivism

According to the connectivism theory, introduced by Siemens in 2004, technology makes it faster and easier for college students with D/d/HH to access knowledge in , helping them overcome an unequal educational system. Connectivism identified four fundamental principles

for learning: Autonomy, connectedness, diversity, and openness. These are critical components of connectivism learning in networks. Therefore, connectivism theory is regarded as helpful in accommodating online learning for students with hearing difficulties and improving learning results by giving students active access to learning through web-based technology tools or resources with access to networking within a community of interaction 24 hours a day, inciting knowledge or ideas at the point when needed (Corbett & Spinello, 2020; Crosslin, 2021; Dennis, 2020; Downes, 2010; Siemens, 2004, 2005, 2006; Siemens & Downes, 2008).

Bridging the gap between audism and connectivism theoretical frameworks as an equitable collaboration for new learning and accessibility fills in the gaps in the literature for college educational leadership to consider best practicing. Audism and connectivism theoretical frameworks support this study, exploring the unique experiences of college students with D/d/HH regarding their access to communication being met in OLEs. This study's research questions explore how college students with D/d/HH describe their hearing experiences with communication within the OLEs utilizing a qualitative descriptive design methodology.

Literature Gap

There are notable gaps in the literature concerning students with D/dd/H and their learning experiences, particularly in OLEs. The experiences of audism are based on the notion that being able to hear makes one superior and privileged and promotes micro-aggressions (Alahasawi, 2016; Eckert & Rowley, 2013). In addition, throughout history, the D/d/HH population was oppressed, forgotten, and neglected access to communication by the scholarly community because of being labeled as "mentally retarded" or "deaf and dumb" (Sgroi & Sinclair, 2018, p. 58; Sgroi & Sinclair, 2018, p. 63). This historical oppression has resulted in the dehumanization of those with D/d/HH, presenting them as inept and intellectually inferior

(Alahasawi, 2016; Eckert & Rowley, 2013; Humphries, 1977; Lane, 1999; O'Connell, 2021).

Lived Experiences of College Students with D/d/HH

Exploring the lived experiences of college students with D/d/HH in OLEs has been limited to knowing what sort of challenges with access to hearing online and strategies to improve hearing. The research has focused more on college-hearing students with learning disabilities within OLEs, despite more college students with D/d/HH increasingly enrolling in online courses ((Alsalamah, 2020; Counselman et al., 2020; National Deaf Center [NDC], 2019). Lash and Helme (2020) research participants' experienced stigma, including feelings of sorry, unworthiness, being labeled as not being "normal," and the perception of having a lack of intelligence. For example, these interpretations of quotes from those with D/d/HH and experiences of stigmatization align with the current literature and LaChapelle's (2023) findings:

- You don't look Deaf, and you can speak! [The hearing community ignored and neglected to meet the unique learning needs of students with D/d/HH (Counselman et al., 2020; LaChapelle, 2023).]
- I am fighting for my rights with so many barriers and challenges, trying not to give up. [The student's response with D/d/HH explained that being ignored or forgotten was a traumatizing experience (LaChapelle, 2023; Parker et al., 2021; Stapleton, 2016).]

D/d/HH Completion and Graduation from College

Research on the D/d/HH for colleges' four-year graduate or post-graduate online programs was almost non-existent (Counselman et al., 2020). Low admissions, low student satisfaction, and dropout rates among college students with D/d/HH are often the result of a lack of communication accessibility (Moreland et al., 2022). In contrast to the 11% of hearing students enrolled in college, only 5% of students with D/d/HH are enrolled (Garberoglio et al.,

2019). In addition, compared to just over two years for hearing students, it took an average of five years following high school for students with D/d/HH to enroll in college, and overall, there are lower educational levels and a lower likelihood of degree completion (Beal et al., 2021; Garberoglio et al., 2019; Garberoglio et al., 2020; NDC, 2019; Nicodemus et al., 2021).

Beal et al. (2021) conceptualized that there are no identifiable solutions in the gaps of literature to meet the needs of an unknown amount of college students with D/d/HH needing sign language interpreters (Counselmen et al., 2020; Sgroi & Sinclair, 2018). Hence, from 1998 to 2018, only seven evidence-based research articles were found in the literature (Bell & Foiret, 2020). The D/d/HH population's systemic disparities for college students with varied hearing needs are prevalent and particularly complex and need more equitable access to OLEs and technology-assisted hearing devices or resources (FCC, 2021; Garberoglio et al., 2020).

Research Methodology and Design

This study used a qualitative descriptive design to explore an unknown phenomenon when it was vague or an unknown cause of the problem by helping to deepen understanding of phenomena by obtaining participants' descriptions of meanings as experts in their lived experiences within their natural context (Tomaszewski et al., 2020). A recruitment flyer was emailed to the National Deaf Center (NDC) Listserve and the Association on Higher Education and Disability (AHEAD) social media platforms composed of college student participants who were at least 18 years old, hearing difficulties not exclusive to having a medical diagnosis, and had finished one online course for an academic degree or an occupational or vocational program in the United States between 2017 and 2022. Purposive sampling was used to recruit 15 college students with D/d/HH after receiving Institutional Review Board (IRB) approval.

Instrumentation

Qualtrics questionnaire included informed consent that determined the 15 participants remained anonymous and met the study's criteria; they participated in a 30-minute Zoom recorded interview with captions and transcriptions. During the semi-structured interview, LaChapelle (2023) used a modified version of the Listening Inventory for Education- Revised the (LIFE-R) section called *After LIFE* grouped into three primary questions with follow-up questions (Nelson et al., 2020; see Appendix A). Hence, the fourth question in this study identified demographics and characteristics (see Table 1).

Data Analysis

This study was conducted using qualitative methodology with a descriptive design. The trustworthiness of the data was ensured through credibility, transferability, dependability, and confirmability (Berner-Rodoreda et al., 2020; Creswell & Creswell, 2018). Field testing validated the credibility of the study's instruments (Creswell & Creswell, 2018; Santos et al., 2020). Furthermore, securing the data for three years enhanced the transferability of the data.

Dependability throughout the study data is achieved by reflective journaling the descriptions of the participants' perspectives (Bloomberg & Volpe, 2019). Member checking, bracketing, the audit trail, and LaChapelle's (2023) positional statement minimized biases and confirmed the accuracy of participants' perspectives. Confirmability was ensured through the saturation of participants' responses (Aspers & Corte, 2019; Bloomberg & Volpe, 2019).

The confirmability ensured the trustworthiness of the results by utilizing thematic analysis, ensuring the findings were accurate participant descriptions without interference or bias (Berner-Rodoreda et al., 2020; Creswell & Creswell, 2018). Manual coding identified the patterns and themes from participants' phenomenon of difficulty hearing experiences. Braun and

Clarke's (2019) six-step inductive thematic analysis included the following steps: (1) familiarizing the data, (2) generating initial codes, (3) searching for themes, (4) reviewing the themes, (5) defining and naming themes, and (6) producing the report:

Step 1: The data collection used Zoom video recordings and member checking of transcriptions to verify accuracy. The identifying keywords and phrases in the transcriptions were re-read and analyzed using reflective note-taking, memoing, identifying similarities and patterns, describing participants' experiences, and categorizing patterns using Microsoft Word.

Step 2: Initial codes were developed by evaluating the transcriptions and the codes' content with clear definitions and highlighting relevant and meaningful patterns to generate the preliminary codes. Data evaluation allowed for ongoing comparison to ensure that this study's analysis focused only on the triangulation of relevant data. As a result, a second-level coding manual was developed to ensure this study was categorized only on relevant data.

Step 3: Patterns were analyzed to collate codes into categories for themes across the dataset that corresponded with the literature, research problem, purpose, and research questions. For instance, codes were collated into potential categories of themes, generated a thematic map and ongoing analysis of each theme to generate clear definitions. Therefore, some codes were redefined or eliminated because they were irrelevant or not confirmed using triangulation. In this pragmatic thematic analysis method, a thematic map with the ongoing analysis verification of each code, detailed theme data patterns, and definition validated the findings further.

Step 4: Collated codes were reviewed and modified to verify the themes' consistency to represent the data accurately and support this study's thematic map accurately. The meaning and significance of patterns validated the themes aligned with the research questions and problem.

Step 5: A continual analysis was conducted to identify precise definitions and name each theme and subtheme. Each theme and subtheme explained the relationship and interaction of each theme and related to the central theme, showing the significance of the data emerging from the themes relevant to the research question.

Step 6: Results were generated as themes and subthemes, demonstrating novel results by interviewing until saturation and finding nothing new in the participant's responses to the research questions and literature (Braun & Clarke, 2019; Feng & Behar-Horenstein, 2019).

Assumptions, Limitations, Delimitations

The qualitative research philosophy includes ontological, epistemological, axiological, and methodological assumptions presented by Guba and Lincoln (1988; Creswell & Poth, 2018). Lachapelle (2023) implemented ethical assurances in this study by maintaining objectivity, rechecking data accuracy, and constantly seeking hidden biases. Research biases and technology problems were identified as a limitation of this study and addressed through bracketing, reflective journaling, expert- and field-tested questionnaires, creating credibility, and member-checking the transcriptions (Archibald et al., 2019). The sample size limitation of this qualitative descriptive study could not be generalized in all situations (Creswell & Creswell, 2018).

The following delimitation of the sampling of this study did not identify whether participants had other disabilities or required ASL. LaChapelle (2023) consulted experts in the field and current research on ASL that many variations, participant exposure to ASL, and the cost of ASL interpreters per interview may have been different (Beal et al., 2022). Nonetheless, participants could provide written responses to the semi-structured follow-up questions via email or telephone interviews. Hence, all participants declined and did not request an ASL interpreter.

Findings

The findings stem from the four research questions (LaChapelle, 2023). The 15 participants further explained below in their responses to the three primary semi-structured interview questions focusing on how they describe their experiences with supportive and unsupportive technology-assisted hearing devices or resources within the college's OLEs (see Appendix A; Table 2). Hence, the participants' fourth question had no themes or subthemes and solely identified demographics and characteristics (see Table 1). Briefly outlined, before highlighting participants' quotes and subthemes, are the 12 themes described as follows:

Research Question 1. How do College Students with D/d/HH Describe their Hearing Experiences with Communication within the OLEs?

LaChapelle (2023) identified six themes from research question one from participants' overall descriptions and experiences of their ability to hear within online learning. The predominant six themes were: (1) positive extrinsic support (connectivism) impact on accessibility; (2) negative extrinsic support (audism) impact on accessibility; (3) positive extrinsic support (connectivism) impact on self-advocacy and autonomy; (4) positive extrinsic support (connectivism) impact on the level of engagement and emotions; (5) negative extrinsic support (audism) impact on self-advocacy and autonomy; and, (6) negative extrinsic support (audism) impact on the level of engagement and emotions.

Research Question 2. What technology-assisted hearing devices or resources do students with D/d/HH describe as being supported with learning within the OLEs?

LaChapelle (2023) identified three themes from research question two: College students with D/d/HH describe their supportive hearing experiences with learning within the OLEs (see Table 2). The predominant three themes were: (1) identification of positive extrinsic supports

and resources (see Table 2), (2) impact on autonomy with equitable, accessible support outside the classroom (see Table 2), and (3) positive extrinsic support impact on engagement.

Research Question 3. What technology-assisted hearing devices or resources do students with D/d/HH describe as unsupported with learning within the OLEs?

LaChapelle (2023) identified three themes from research question three: (1) identification of negative extrinsic support and resources (see Table 2), (2) impact on autonomy and self-advocating among college students with colleges lacking policies and best practices, (3) negative extrinsic support (audism) impact on level of engagement.

Research Question 4. What are the characteristics of students with D/d/HH within the OLEs (see Table 1)?

LaChapelle (2023) did not identify themes from research question four: This question focused on the participants' demographics and characteristics, including a medical diagnosis of hearing loss, age, employment status, level of education, gender, race, and ethnicity (see Table 1). Each participant in this research received a hearing loss diagnosis. 80% of the participants were men, 20% were women, 53% were between the ages of 24-29, 27% had completed a 4-year degree, and 100% had full-time jobs. Participants were 20% Asian or Asian American and 80% Black or African American regarding race and ethnicity.

Table 1
Sociodemographic Characteristics of Participants

Baseline characteristic	Number of participants	Percentage of participants
	n	*%*
Diagnosed with a D/d/HH medical diagnosis	15	100
Age		
24-29 years old	8	53
30-34 years old	5	33
35-39 years old	1	7
50-Plus year old	1	7
Employment		
Full-time	15	100
Education		
2- year	1	7
4- year	4	27
For-profit	4	27
Non-profit	3	20
Certificate	1	7
Master's	1	7
Doctorate	1	7
Gender		
Man	12	80
Woman	3	20
Race and Ethnicity		
Asian or Asian American	3	20
Black or African-American	12	80

A more in-depth explanation is below for the three primary semi-structured interview questions focusing on participants describing their hearing experiences (LaChapelle, 2023).

Research Question 1

RQ1 asked: How do college students with D/d/HH describe their hearing experiences with communication within the OLEs? Six themes and seven subthemes emerged from the data, filling in the gaps within the literature utilizing the theoretical frameworks of connectivism to overcome audism: Lived experiences of college students with D/d/HH unique hearing difficulties and accessibility to technology-assisted hearing devices or resources within OLEs.

Theme 1: Positive Extrinsic Support (Connectivism) Impact on Accessibility

Participants were asked to describe their hearing experiences within OLEs; all 15 participants expressed unique hearing differences and challenges within OLEs. On the contrary, Participants 5, 6, and 8 shared that despite the challenges, they enjoyed the flexibility of online learning and felt others sometimes supported by hearing differences. For example, Participant 5 noted, "I like online learning because of its flexibility. I like to feel like I am welcome in the community and that people are supporting me. That makes the difference." Participant 6 stated, "At first, it was quite good because online was flexible with my schedule. However, as time went by, my hearing problem started, and it was becoming quite hard."

All 15 participants reported that having hearing difficulties, they needed equitable access to communication to collaborate and engage within OLEs. Participant 8 expressed:

> I could say that my experience has been somehow quite well good for me, though there is also some negativity about the experience, and the one thing that I like is…learning with other people makes good practice to use both in class and electronically [technology hearing devices and resources], thus, that has improved much of communication and collaboration for me.

College students with hearing difficulties need more communication and collaboration with extrinsic support to access equitable communication within OLEs.

Participants shared that having difficulty hearing and adapting autonomously within OLEs caused them to miss information, lag, or feel alienated. For instance, Participant 3 stated:

> Generally, there have been ups and downs, good and bad sides, through online learning. Yes. Most of it is adapting because it is a new thing trying to adapt. Because one thing I have known about learning is that if you do not understand a class previous to the next one, the next one, you are also going to be lost.

Regarding participants feeling alienated and misunderstanding the information, college students with unique hearing difficulties were underrepresented and marginalized as they attempted to be autonomous, adapt, and self-advocate, asking for extrinsic support. For example, Participant 10 stated, "I feel bad, and they do not care. Yeah, I said that. I think they did not care because maybe a small group of students is asking for that [equitable accessibility to hearing, communication, and engagement]." Furthermore, some participants felt treated unequally and experienced negative and self-blaming emotions when asking for support. Participant 5's experience revealed that self-advocating for extrinsic support with their unique hearing difficulties, they "felt like this was because of my situation or what else happens? I felt frustrated because I was not treated as an equal. So, I felt that. It was bad, just something bad towards me."

Subtheme 1: Equitable Accessibility (Connectivism). Connectivism allows college students with unique hearing difficulties to access information independently and equitably after class. Students supported extrinsically could access OLE classroom information from online postings or resources sent directly to students. For example, Participant 3 explained that "they would post after the class session. So, if you needed to follow up, you could access the Google

Drive they posted. Similarly, Participant 4 stated, "Exactly, yes, just to put in the cloud. Okay, something with me, I like online, when having very easy to access with audio." Participant 14 commented, "Professors sent the recordings to everyone. However, if I had made a special request to record the class, then would send it to me alone."

Subtheme 2: Positive Extrinsic Supports on Self-Advocacy and Autonomy (see Table 2). The subtheme sequences of positive extrinsic supports versus negative extrinsic supports impacted how students adapted to having unique hearing differences, self-advocate, and having autonomy with access to hearing and learning. College students, such as Participants 1, 2, and 9, with hearing difficulties with positive extrinsic support, were more likely to overcome challenges and adapt to their unique hearing needs autonomously or through advocacy.

Participants 1 and 9 described how positive extrinsic support impacted the ability to record classes indicated by Participant 9 autonomously:

> I used this app, Filomora [provided by the college], to record the classes so I could listen later. However, this was handy when I knew I would miss the class and have trouble understanding. Because I would understand the concepts better when I read it live [transcriptions] and can ask questions immediately. So, I would reuse a Filomora to record the classes later; I could listen to it slowly. I could rewind when I could not hear [adapt], and sometimes, I would call my colleagues to verify some facts. So, I had to figure out which would work best for me [autonomy].

Participant 1 noted, “I recorded some lessons to capture them later. Alternatively, ask around some of my friends. I would slow down the captions and the recordings.” Participant 2 experienced both positive and negative emotions:

> You had to explain something they were saying that they did not understand. I did learn that the professors and disability support services were learning with me [self-advocate] because I felt good. After all, they were open-minded about learning, but at the same time, it made me feel sad because of their unawareness about hearing loss.

Theme 2: Negative Extrinsic Support (Audism) Impact on Accessibility

When the 15 participants were asked to express their experiences of positive extrinsic versus negative impact with hearing difficulties, they explained requiring extrinsic support for accessing technology-assisted hearing devices or resources. Participant 2's perceptions of being accommodated with extrinsic supports were described as follows:

> During that period, I could not be taken seriously and maybe understand that I needed that assistance from them. Yes, that period when they delayed understanding my situation; I can say that was something that never made me happy.

Furthermore, participants showed evidence of audism. For instance, Participant 4 stated:

> Well, so they take you as slow. Moreover, I want everybody to be fair. So, I adapt to the situation. Teachers, let us say, for example, need support. Let us say equally, explain to him or her okay, and so you know, overall, with the experience online learning. You know it.

Participants struggled with being treated equally as students who needed assisted hearing within OLEs. Participant 5's example of having difficulty hearing within OLEs:

> It was bad for me because, you know, you feel that why am I being treated this way? I felt like others who could hear, very well had more advantages than me and were more able to pass the exam than I did because it was something that I felt I would be the last one in class to finish the exam.

Subtheme 1: Inequitable Accessibility (Audism). The subtheme audism versus connectivism negatively impacted how extrinsic support lacked appropriate technology-assisted hearing devices or resources for college students with unique hearing difficulties. Without appropriate extrinsic support, Participant 9 explained:

> Generally, I used to have some trouble. I did initially get everything as clear. So yes, my experience with online classes regarding my hearing was troublesome. I would say that most of the time, from my experience, I was unsupported.

Participants 4 and 12 had increased challenges when unsupported were denied or randomly provided transcriptions. Participant 12 shared:

> My hearing problem has been somewhat of a challenge, but other times, I could handle them. At first, I saw that I faced some challenges like sometimes I could not cope with what they were saying because I did not have live transcriptions.

Furthermore, when students cannot hear or understand, they further require transcriptions to have access to communication. Participant 4 also stated, "Sometimes transcription will be given minimally and can be difficult. Sometimes, with online learning, I cannot understand."

Subtheme 2: Negative Extrinsic Supports on Self-Advocacy and Autonomy. The subtheme sequences of positive supports versus negative extrinsic supports adversely impacted students who were able to adapt to having unique hearing differences and being able to self-advocate and have autonomy. Participants often self-advocate for accommodations; however, the accommodations must be met. For instance, when Participate 3 asked the professor for video recordings, transcriptions, and captions, the “speech is very quick. By the time the zoom is transcribing, it is too fast… which I may miss some facts.” Therefore, Participant 3 said, “At

first, I used to try to ask the lecturer to repeat and that despite what you just said, I missed it. However, then often that it stopped being effective."

Participant 7 expressed not advocating or asking repetitively for support because "some would be delayed, and some would have to ask again." Therefore, Participant 7 had video recordings randomly or denied. In addition to this, when Participant 10 was having difficulty hearing because of background noise and requested accommodations, they emphasized feelings of troubling others when self-advocating:

> Sometimes, I felt okay to ask, and other times, I felt like I was troubling this person. I have to follow up after every lesson to ask questions and with all that. Thus, I do not all the time; sometimes, I follow up because sometimes I will feel like I am asking more from the teachers.

Subtheme 3: Underrepresented Student Population. Participants explained the sub-theme of the underrepresented student population as a possible reason for being denied reasonable accommodations with technology hearing devices or resources to support students with hearing difficulties within OLEs. Participant 1 described, "As for me unless it is a huge amount of people and some of the schools do not consider bringing sign language interpreters according to their policies." Participant 10 was also not accommodated with a sign-language interpreter when needed to access hearing and communication within OLEs.

When asked whether they asked to have an interpreter, Participant 10 replied, "No, I cannot say yes because in school, it is only a small group of people who have a hearing problem, and it would be hard for the school to do something like that." Therefore, because college students with hearing difficulties are an underrepresented student population, they often are not provided reasonable accommodations that meet the needs of their unique hearing difference.

Participant 8 further explained that "sign language interpreters are not always provided. They normally use transcription more often."

Theme 3: Positive Extrinsic Support (Connectivism) Impact on Self-Advocacy and Autonomy

Participants described their hearing experiences as both the positive impact of connectivism and the adverse effects of audism. Therefore, a theme emerged: The positive impact of college students with unique hearing difficulties on being autonomous and self-advocating for accommodations. Participants were more likely to be efficient independent learners who self-advocate to meet the needs of their hearing difficulties when technology-assisted hearing devices or resources are accessible. Participant 8 asked, "professors sometimes slow down [i.e., captions and transcriptions] because it helps me to listen and understand."

Participant 2 commented:

> You have to ask for it, or you do not get it. However, I just learned that so many people in higher education, let us say, do not deal directly with that type of situation. They have no idea what it takes for somebody with my type of hearing loss and how we learn in the classroom. Yes. So, the good part about it is that they learn and will be very quick to provide what I need.

Therefore, several participants could self-advocate and utilize autonomous learning after class with video recordings. For instance, Participant 5 "talked to the lecturer [recording]." Participant 9 "knew [recording] I would miss the class and have a lot of trouble understanding." And. Participant 10 "prefers to get video recordings, maybe. So that during my free time, I can go over them again and again and make sure that maybe there are some things I did not get correctly during the lecture." Furthermore, Participant 14 stated:

> Sometimes I could talk to the professor, and I was able to ask them to put on the transcriptions, which was helpful. Alternatively, I will ask them to record the class so that they can send it to me afterward [transcriptions would be accessible during OLEs and in the recording afterward].

Theme 4: Positive Extrinsic Support (Connectivism) Impact on the Level of Engagement and Emotions

Participants discussed extrinsic support's positive impact when provided reasonable technological, hearing devices, and resource accommodations. When asked if extrinsic support with technology, hearing devices, or resources is ever beneficial, participants responded that this impacts their level of engagement and positive emotions. P6 commented, “[professor] used to tell me every time I am free, I will see him. He discussed, teaching me everything I did not understand step-by-step, which positively impacted me.”

Faculty provided participants with technology hearing devices that were accurate or specific to their unique hearing differences within OLEs. Participants felt supported and increased engagement and positive emotions when accommodated with extrinsic support. For example, Participant 8 stated feeling “when they put on the transcription and update the size. It was helpful for me to get to know and understand.” Participant 2 expressed:

> I was excited about it because I could participate more online than at the time in the classroom. The CART was provided in the classroom, and seeing the professor seemed easier for me…it was more engaging…which I am enjoying.

Theme 5: Negative Extrinsic Support (Audism) Impact on Self-Advocacy and Autonomy

When participants described their hearing experiences with communication within OLEs, many expressed audism experiences. For example, Participant 10 explained, "Yeah, the

experience has not allowed me to do my best. Furthermore, if I had a chance to choose more meaning to the online classes, they would not give me what I needed because of hearing difficulties."

Participants were in a dilemma of advocating for reasonable accommodations with inappropriate responses or attempting to be autonomous in the multidimensional system without having access to appropriate technology hearing devices or resources. Participant 6 described these times when having difficulty hearing "for those unwilling to help. Okay, I have to work harder, and you are left figuring it out for myself, which I find quite complicated." Noteworthy, Participant 14 explained that they might stop advocating, such as "would either raise my hand or use the tools. Alternatively, decide to turn my mic on and ask the question. If I do not feel like I can do that because I have done that often [ignored by others or bothersome to others]."

Exploring access communication for college students with D/d/HH inside OLEs requires no "one-size-fits-all" approach (Lynn et al., 2017, p.194). According to the literature, college students with D/d/HH have unique hearing difficulties that vary by context and individual circumstances; hence, learning cannot be generalized to all individuals (Alsalamah, 2020; Butler, 2019; Counselman et al., 2020; Garberoglio et al., 2022; LaChapelle, 2023). Without a connectivism theoretical framework, the findings of this study show that exclusionary practices and audism continue in the lack of equitable communication access inside college's negative extrinsic OLEs for the underrepresented D/d/HH population.

Theme 6: Negative Extrinsic Support (Audism) Impact on the Level of Engagement and Emotions

The Participants shared that students' negative extrinsic support caused a lack of engagement and negative emotions. Therefore, college students impacted by negative extrinsic

support often felt "left out." Participant 15 further explained:

> Sometimes I feel left out because I see the same students learning the same thing in class, but I feel left behind because I have not gotten all the concepts. I want to do well, but others are doing better than me and have the advantage of getting ahead. I feel left out and discriminated against, but I must cope.

Not only did Participant 10 feel left out, but they also had difficulty "trying to catch up." For example, "taking notes has been difficult, and the other thing is on following up because, by the time I am trying to catch up, I think it is hard because maybe the teacher has already moved to another section." Nor could Participant 14 engage in classroom discussion. "I would say they were. They were hard sometimes. They were hard because I could not and could not participate in discussions." Moreover, Participants would be absent from class as described by Participant 14, "I will say, around three years but on and off [absent from class and quitting college] because, by the end, I left the class."

Subtheme 1: Increased Feelings of Frustration and Anger. Increased feelings of frustration and anger were described by Participants when not supported with reasonable technology hearing devices or resources to hear, understand information, or have access to communication learning with OLEs. For example, Participant 8 stated, "I feel bad because it is really hard to understand the content of what the professor is telling me. So, it is frustrating." Participant 3 spoke from personal experience and frustration: "Frustrated because I expect learning to be exciting, especially since it is online, it should be comfortable for me; yeah, very frustrated."

Participant 5 questioned, "why am I being treated this way when others in a good situation are given everything they need? Why am I not sure? I felt frustrated so much." Without

effective and consistent technology hearing devices or resources, Participant 1 expressed:

> The captions were going fast for me. So, the professor was too fast—difficult time understanding. I was feeling frustrated. Okay, I would slow down the captions. Then sometimes the captions were provided, sometimes not, sometimes it was not this sort of random and how that you know, feeling frustrated, angry.

Subtheme 2: Increased Feelings of Alienation and Isolation. Participants expressed increased isolation and alienation when not supported with reasonable technology hearing devices or resources. Participant 11 "At times when I could not understand, so it is like I had to wait to go through my next class." Participant 14 witnessed "everyone engaging, was talking, and I was trying to hear things. I was not able to even able to know what was going on. It annoyed me to the point of not going to class." Participant 9 explained:

> Sometimes these experiences are so frustrating. Furthermore, sometimes you feel like just leaving the class and relaxing because sometimes they stress you out. You are there running around trying to understand what was just said, not because I do not understand the topic or the concept. It is just that you cannot hear what they are saying. The crucial words are just passing by. Yes, sometimes I am tempted to say what the hell?

Research Question 2

RQ2 asked: What technology-assisted hearing devices or resources do students with D/d/HH describe as being supported with learning within the OLEs? Three themes and four subthemes emerged from the data in response to this question regarding college students' equitability and accessibility to technology-assisted hearing devices or resources within OLEs.

Theme 1: Identification of Positive Extrinsic Supports and Resources (see Table 2)

Participants were asked to describe their experiences of supportive versus unsupportive technology technology-assisted devices or resources. Participants commented on the video recordings, transcriptions, sign language interpreter, captions/ subtitles/(CART), hearing aids/headphones/amplify, visual aids, online chat, professor support, peer support, disability services, IT, college administrators/policies, support outside the classroom online/library, and multiple supports simultaneously. However, participants explained that support might be both supportive and unsupportive. Coincidingly, research questions two and three overlap.

Theme 2: Impact on Autonomy With Equitable, Accessible Support Outside the Classroom (see Table 2)

Several participants recognized that having equitable access to support outside the classroom increased the autonomy of college students with hearing difficulties. Participant 12 said:

> At my school, there are also recordings. Lectures and the teachers will give us the recordings of the previous classes. So, I will go through it slowly in my own time, and that is how I coped with it; it was available for the whole class because anyone who wanted to access it.

Not all participants had access to outside support. Participant 3 explained:

> It depends; some lecturers teach outside the classroom and not from Zoom, and then they would post their sessions on their Google drive to access the classes from there. Even if you miss the classes so, that is for my help.

Participants described that accessing missed information in the OLEs was available through video recordings with transcriptions/captions or in the library, online web cloud, and

peer support within group sessions to increase engagement. Participants explained that they could have increased autonomy and engagement by utilizing peer support. Participant 4 stated, "Cannot hear your peers or colleagues…, you would reach out to them after class."

Subtheme 1: Peer Support Group Sessions/Postings to Increase Engagement (see Table 2). Participants recognized that they could access missed information or notes from class by having peer support outside the classroom. Participant 4 shared, "Yeah, I did not think about it so much because I have my friends. I could get my friend's notes or meet on Zoom later." Participant 6 also expressed having peer groups as supportive: "We would have the same subgroup so that we could help each other in the same way." In addition, Participant 6 stated, "Some friends as well, who are so supportive like we will discuss, maybe what we would discuss what was in class today."

Subtheme 2: Video Recordings with Transcriptions and Captions (see Table 2). The subtheme video recordings with transcriptions and captions being accessible outside the classroom were mentioned by several participants. Participant 13 "could say, for example, the video recording with transcriptions provided later through an email or classroom would be appropriate for all the classes." Video recordings with transcriptions after class, Participant 7 noted that "the transcription would make it better. I think reading for me is better than listening. Sometimes, I may miss some words, but with reading, I do not think I can miss anything." Furthermore, by having the video recording accessible, Participant 6 uses "the recordings, I back to them, or go through them, and revisit them. At some point, even during, maybe even revisit them for my assignment or exams."

Subtheme 3: Online Library Support (see Table 2). Participants 2, 5, and 9 explained that they go to the online library independently to access information from OLEs. However,

Participant 2 stated that sometimes “that could be a nightmare. You know what the professors would tell you: go to the website and reach out to the live chat person in a library or try to figure things out yourself.” Nonetheless, Participant 5 explained going “to a library and finding materials there. They mostly provided recordings; I could go there and use them. Give reading materials to you to have information on the topic so I can understand.” Although Participant 9 denied accommodations for recordings, they explained, "I tried to get the missed information by doing my research, going through books, going through documentaries, and seeing if I could recover from my loss [lack of hearing and access to communication within the OLEs].”

Subtheme 4: Online/web-cloud Support (see Table 2). Several participants explained that uploading OLE information from the OLEs into an online/web cloud is supportive and accessible. As expressed by Participant 4, “I think, let us say, for example, you upload and share using a PC for people to understand because they will be able to see.” Participant 13 suggested, “For example, the recording should be for many people [available after class].” Likewise, Participant 9 spoke from their perspective that “they would have to record the classes and maybe upload them to the school website or the faculty website. So that students from all over the university would access the classes later.”

Theme 3: Positive Extrinsic Support Impact on Level of Engagement

Participants mentioned that despite having hearing difficulties, they could be engaged and have access to communication with effective technology, hearing assistive devices, or resources within OLES. For instance, Participant 2 noted that “the professor would create groups so we could learn from one another” in peer groups or discussions.” Besides, Participant 7 agreed that “they could share in the breakout rooms to make it interesting.” Participant 2 further explained:

> [Being in groups] made my participation better. I was able to participate more. It was more engaging; I could quickly respond to a question or something the students were talking about in the classroom. Online, it is easy for me because I am reading [captions, transcriptions] everything, and I am not missing anything, so I am getting the information in the online program.

Participant 12 thought transcriptions "should be mandatory for everyone with a hearing problem so that they can focus [engaged]."

Theoretical implications of this study point out how connectivism theory aided college students' hearing problems in OLEs, negatively altering their level of participation, emotions, and ability to self-advocate and autonomous learning to gain consistent communication access. When offered accessible support within and outside the classroom, all participants stated they had a practical and effective impact. The findings of this study verified connectivism theory as a theoretical result for participants to describe how listening within OLEs benefited them to engage in peer support, professor support, access to video recordings with transcriptions and captions, online library support, and online/web-cloud support. For instance, aligned with the literature, the 15 participants demonstrated that they needed to collaborate simultaneously within the multidimensional system of extrinsic multiple learning resources to self-advocate and adapt to their unique hearing effectively (Counselman et al., 2020).

Research Question 3

RQ3 asked: What technology-assisted hearing devices or resources do students with D/d/HH describe as unsupported with learning within the OLEs? Three themes emerged from the data in response to this question regarding college students' lack of equitability and accessibility to technology-assisted hearing devices or resources within OLEs.

Theme 1: Identification of Negative Extrinsic Supports and Resources (see Table 2)

Research question two of college students describing supportive technology-assisted hearing devices or resources overlap with research question three of college students representing unsupportive technology-assisted hearing devices or resources (see Table 2). Participants identify the supports and resources provided, not provided, or sometimes provided within OLEs. Participant 10 "prefer to get video recordings, maybe. So that during my free time, I can go over them repeatedly," but was ignored and denied after self-advocating for accommodations. Participants 6 and 12 explained that transcriptions would accommodate their hearing difficulties. Participant 12, ignored and delayed, stated, "I think that should be mandatory for everyone with a hearing problem so that they will be able to focus." When Participant 6 accommodated transcriptions, they were ineffective because "some transcripts I will find like maybe at some point the spellings are not right or maybe I would doubt them."

Subtheme 1: Disability Services (see Table 2). Disability services support impacted college students with hearing difficulties within OLEs were recognized by 10 Participants as unsupportive. Two participants reported being both supportive and unsupportive. None of the Participants recognized disability services as supportive, available, and effective. In contrast, one of the two Participants who identified disability services as supportive and supportive asked for support and accommodations. For instance, Participant 1, who identified disability services as both, received a delayed response from disability services and stated, "The first year, I explained to disability support services what I needed, but they did not understand what was needed."

Participants 3 and 9 stated they did not know whom to ask for support or how to access disability services. For example, when asked if they knew where to go or whom to ask for a sign language interpreter, Participant 3 replied, "No, I wouldn't because it was online. I did not know

whom to address this with." Similarly, in response to being asked whether they knew whom to ask for support, Participant 1 stated, "No, not at that time." Participant 9 described how the availability and effectiveness of disability services impacted how he communicated with their professor, so it is important to understand the level of awareness of having access to technology, hearing devices, or resources within the multidimensional system. Participant 9 spoke from personal experience:

> In my case, I face the lecturers directly. Furthermore, this, I would say, showed a better way of communication. Some lecturers [professors] usually feel like if you go to the school management. You are going behind the back, so I would prefer to talk to them directly and explain the situation.

Theme 2: Impact on Autonomy and Self-Advocating Among College Students With Colleges Lacking Policies and Best Practices

Many participants shared their experiences adapting to the extrinsic multidimensional infrastructure about addressing colleges' lacking policies and best practices for students' difficulty hearing within OLEs. Participant 12 commented, "And, some things, and that is lack of good infrastructure." As a form of audism, participants felt ignored, forgotten, or unwilling to accommodate their unique hearing difficulties within OLEs. However, Participant 12 expressed as an alternative to audism, "They would not check on me that could aid in my problem, you know. Moreover, I think some of our teachers may not have adequate knowledge for handling such students like us."

Nevertheless, Participant 13 stated, "With hearing problems, we do not get proper instruction of the lesson. Let us say instructors in some instances, for example, yes, there is no

routine for every person to have access to communication." Participant 14 spoke from personal experiences:

> It would be nice if the professors or the school knew that not everyone is okay and that some people have disabilities and want to learn; they want to be in a class where they can learn. I am learning normally with others because I want to experience that I do not want to or have to request all this to help me. How about having the transcripts or someone helping by just implementing it? Because that will be helpful.

Subtheme 1: Lacking Access to Effective and Available Technology-Assisted Hearing Devices or Resources (see Table 2). Several respondents expressed that access to adequate and accessible technology-assisted hearing devices or resources included students receiving inconsistent appropriate responses when self-advocating for themselves. Participant 3 felt "anxious" without having consistent or proper responses to self-advocacy. "I was crossing my fingers to wish she [sign-language interpreter] would be available because it would be a plus if she were there. Zoom cannot transcribe it like this." For instance, having consistent access to effective and accessible resources, Participant 5 noted, "I could see that there was a person they are using sign language… so I could easily understand. It would do very well because you can easily understand what is happening and cannot lag." Furthermore, Participant 6 explained that "Okay, some. I did not have to ask for them, but some gave them to me even without asking."

Subtheme 2: Lacking Professional Development and Training. Regarding participants explaining that being an underrepresented student population having difficulty hearing within OLEs, colleges need professional development and training. Participant 5 expressed their feelings of frustration:

> It has been very difficult when hearing online. So, the lecturers want to teach you online … and you find it difficult to understand. Furthermore, when you ask some of them to explain more because you have not understood, they can be ignorant at some point.

Participant 2 shared, "I do not think they have that many students asking for services for hard-of-hearing people. So, I kind of like opened the door about that for them." Therefore, Participant 13 noted, "Let us say there is a lack of learning resources, and instructors have limited experience with online learning."

Subtheme 3: Lack of Appropriate IT (Internet Technology) Services (see Table 2). The participants shared their experiences when they struggled to access IT support. "Some struggle especially, let us say, lack of access to technology," Participant 13 commented. Consequently, Participant 12 stated, "IT office: Most of the time, they will delay correcting the problem." In contrast, Participant 9 noted that "the IT department would help. However, this was specifically when you were doing online exams for classes; I never really asked ." When asked what they did you do when the technology was not working was their support, Participant 10 responded that they would contact the IT department. However, Participant 11 commented, "Actually, I do not think the internet problem is going to be fixed right away."

Subtheme 4: Simultaneously Using Multiple Technology-Assisted Hearing Devices or Resources Support (see Table 2). Participants identified that their unique hearing experiences require them to access multiple technology-assisted hearing devices or resources simultaneously, depending on the context of information learned within the OLEs. For example, Participant 11 explained, "Okay, in some classes, the lecturers were very clear, and I could hear everything, and some of them were not fully clear. I use transcripts; some were unclear, and I use video recordings." Similarly, Participants 8 and 12 explained that although they have not been

accommodated with multiple support simultaneously, Participant 8 noted, “I think adding a sign language interpreter to existing subtitles would be helpful.” Participant 12 would also “use them if all [transcription, sign language interpreter, recordings] available. They will be very useful because I think I will do better.” However, many participants commented on overcoming the challenges of collaborating with others to understand how to accommodate them with multiple supports or resources simultaneously. Participant 5 shared their lived experience:

> I can say that initially, they did not understand my situation, and that is why they never provided them. After explaining the situation to them, they asked me what I preferred and gave me several choices. They asked me what I preferred, whether transcription or an interpreter would work better. Then they provided those for me.

Theme 3: Negative Extrinsic Support Impact on Level of Engagement

Many participants described that it is easier to hear and engage in OLE discussions with effective and accurate accommodations with technology hearing assistance or resources. For example, Participant 9 further explained, “First of all, that would be like an instant misleading point because it will throw you outside the concept being discussed [inaccurate transcriptions].” Participants explained that when they have difficulty hearing online, they lag and cannot engage in the classroom; therefore, they need additional support. Participant 5 explained:

> After realizing I was lagging, I had to call the lecturer to ask the lecturer. So, I called him asking to ensure that whenever in online, maybe he ensured that he could have a transcription for me in an online class to understand. So, I could understand what he was asking or what he was teaching.

Participant 5 described feeling ignored and unsupported when engaging in online chat discussions within OLEs. For instance, Participant 5 demonstrated:

> Okay, you can say that you are listening during that period, but no one answers your questions. You ask our questions, but there is no one answering the questions. Then you ask yourself whether others are hearing you or not hearing you. Yes. So, you can say that was something I was never supported.

Many participants stated that disability services were unsupportive. Administrative levels of educational leadership possess negative attitudes or a lack of understanding of the advantages of captions for access to communication (Alsalamah, 2020). Despite the research advocating that captions always be active and available within OLEs, many participants did not have suitable or accessible captions. Participants felt unsupported when they could not access captions or transcriptions and modify the text size and caption speed. Colleges should be expected to have an inclusive multidimensional approach to disability services, including training, professional development, policies, and best practices, to benefit the ability of students to communicate and interact within the OLEs (Counselman et al., 2020; LaChapelle, 2023).

Research Question 4

RQ4 asked: What are the characteristics of students with D/d/HH within the OLEs? This research question was designed to obtain additional participants' demographics to help understand the sample's characteristics. Notably, the participants identified as 80% Black or African American and 20% Asian or Asian American, so there probably were some intersectionality issues. However, that was beyond the scope of this study. The characteristics of college students with D/d/HH within OLEs in this study had unique and diverse hearing difficulties, knowing the technology assistive devices and resources were also on a continuum.

Those with hearing privileges are among the majority who have access to communication. In contrast, the college student population with hearing difficulties, thought to

occur infrequently among an underrepresented student population and widely dispersed, is challenging to recognize accurately. A student with hearing loss may appear to hear normally, but they were misinterpreting the information because they cannot hear speech sounds or words enough. A characteristic of college students with D/d/H is that they often feel frustrated, or their emotional well-being is affected if their needs are unmet.

When Participant 1 attempted to hear and "trying to learn, but I could not, I was getting frustrated." Participant 3 explained:

> Yes, terrible; you think that affects what you are learning. It does right; I think it motivates you. Yes, you lose motivation and morale. The most frustrating thing is that you have to go the extra mile. Nevertheless, you did not have to; that extra mile takes more energy. That extra mile takes more time and energy.

Furthermore, Participant 14 said, "I was so insecure about not being able to hear what is going on."

An implication of this study suggested that many participants expressed negative emotions and were absent from class when they felt unsupported and unable to benefit from using technology-assisted hearing devices or resources (connectivism) promoting communication access for college students with D/d/HH in OLEs. The participants expressed feeling ignored by their professors, which the research noted as the most common racial and audist microaggression recognized by Black students with D/d/HH. Therefore, students who identify as Black with D/d/HH may have a culture that requires inclusivity, not being dependent on whether they self-advocate for reasonable accommodations within the multidimensional system, yet a feeling of belonging (Stapleton, 2016). The connectivism paradigm may enable students of color with various cultural backgrounds and hearing challenges access to appropriate

accommodations inside OLEs that foster positive self-advocacy and autonomous learning (Dennis, 2020; LaChapelle, 2023; Stapleton, 2016; Thompson-Ochoa, 2020).

Summary of the Findings

The study's findings filled the literature gap of college students within OLEs, grasping an understanding of their challenges and lived experiences with hearing difficulties in OLEs (Counselman et al., 2020; NDC, 2019). Exploring access communication for college students with D/d/HH inside OLEs requires going beyond a "one-size-fits-all" approach (Lynn et al., 2017, p.194.). According to the literature, college students with D/d/HH have unique hearing difficulties that vary by context and individual circumstances; hence, learning cannot be generalized to all individuals (Alsalamah, 2020; Butler, 2019; Counselman et al., 2020; Garberoglio et al., 2022). Furthermore, this study identifies gaps in the literature regarding college students' ability to advocate for reasonable and appropriate accommodations with unique hearing difficulties as an underrepresented population within OLEs.

The descriptions provided by participants were consistent with the findings of several research studies indicating that college students with D/d/HH within OLEs must self-advocate for accommodations to access communication (Gin et al., 2021). For instance, all 15 participants had inconsistent accessibility and reported that this affected self-advocacy to utilize technology, hearing devices, or resources. In addition, college students with D/d/HH perceived that they were prevented from receiving appropriate accommodations and equitable access to hearing and communication (Cawthon & Garberoglio, 2021).

To address this gap, LaChapelle (2023) interviewed participants to describe various hearing experiences in the OLEs. Federal ADA laws require colleges to accommodate students with learning differences, including D/d/HH (King & Piotrowski, 2021; NAD, 2022). However,

all participants (100%) expressed inconsistent access to appropriate and effective technology, hearing devices, and resources (Butler, 2019; Counselman et al., 2020). This may explain why many college students with D/d/HH do not request reasonable accommodation in the OLE. Hence, they represent a variety of unique and diverse hearing needs within an unpredictable and unreliable extrinsic support system (Alsalamah, 2020; Butler, 2019).

In the current literature, the theoretical audism framework explains college students' hearing difficulties due to the lack of extrinsic support, and exclusion still exists today (Counselman et al., 2020; Eckert & Rowley, 2013; Humphries, 1977; Lane, 1999; Lash & Helme, 2020; Noodin et al., 2019; O'Connell, 2021; Parker et al., 2021; Stapleton, 2016). Participants' descriptions of audism experiences prevented them from autonomous learning opportunities accessing communication (Beal et al., 2021; Ellis-Robinson, 2021; Garberoglio et al., 2019; Garberoglio et al., 2020; Lash & Helme, 2020; Palmer et al., 2020; World Health Organization (WHO), 2021). This study showed that colleges refused participants one or more effective and appropriate accommodations, making it almost impossible to remain engaged, and some participants reported that they left the course entirely. Study participants with inequitable access were less likely to engage and reported higher emotions of frustration, anger, alienation, and isolation, emotionally affected negatively without positive extrinsic support (Angara et al., 2021; Moreland et al., 2022; WHO, 2021).

The connectivism theoretical framework addresses exclusionary practices by providing equitable communication by permitting students to access technology hearing assistance and resources to self-advocate effectively autonomously with supportive and collaborative opportunities (Alsalamah, 2020; Butler, 2019; Counselman et al., 2020; Garberoglio et al., 2022). The four fundamental principles for connectivism learning: autonomy, connectedness,

diversity, and openness within networks or systems provide equitable accessibility to hearing and communication (Bali & Caines, 2018; Corbett & Spinello, 2020; Downes, 2010; Siemens, 2005, 2006; Siemens & Downes, 2008). Many participants explained that with collaborative, positive extrinsic support, they were excited to learn and engaged when their hearing needs were accommodated by requesting, more importantly, at times, accessible to them without asking and avoiding being denied, ignored, or delayed.

Connectivism also provides equitable accessibility and positively impacts self-advocacy and autonomy, engagement and emotions, and availability and effectiveness of technology-assisted hearing devices or resources within OLEs. As a result, an open, positive, extrinsic, multi-dimensional universal learning system with technology within a network of resources provides students with diverse learning opportunities to meet their unique hearing needs (Corbett & Spinello, 2020). For instance, the participants described that access to support outside the classroom provided opportunities with multiple learning resources simultaneously to engage in peer support, professor support, video recordings with transcriptions and captions, online library support, and online/web-cloud support (see Table 2). Therefore, participants implied that colleges should implement an inclusive multidimensional approach to disability services, including training, professional development, policies, and best practices, to positively impact participants' ability to communicate and hear within OLEs (Counselman et al., 2020).

Recommendations for Best Practices for Higher Education

Some recommendations for higher education stakeholders to consider include the following:

- Technology hearing devices or resources perceived as effective by D/d/HH college students should be accessible equitably and inclusively to D/d/HH students in the OLE.

- These technology devices and resources should be available to D/d/HH students across a continuum of hearing to meet their unique needs.
- Identify and implement policies and best practices that include feedback and input from D/d/HH students in OLEs.

Professional development and training for college staff (i.e., disability services), faculty, and others who may interact with D/d/HH students across a multidimensional system.

- Develop systems to accommodate D/d/HH students in OLEs, whether they have a medical diagnosis or not. Access awareness to the accommodation should be communicated to all students, considering all possible intersectionality.

The literature demonstrated that the D/d/HH population is oppressed and underrepresented, specifically in educational leadership (Alsalamah, 2020; Cue, 2021; Lash & Helme, 2020). Therefore, the educational leadership among the hearing populations must acknowledge that audism exists today and advocate for a more proactive and robust representation for implementing practices and policies abolishing audism (Eckert & Rowley, 2013; Noodin et al., 2019; O'Connell, 2021; Parker et al., 2021). The educational leadership, scholarly, and political communities can implement a connectivism framework as best practice for students with unique hearing differences to overcome audism and gain equitable learning opportunities, hearing privileges, and access to communication within colleges and universities.

Recommendations for Future Research

Some recommendations for future research include the following:

- Determine best practices and policies and perceptions of the effectiveness of educational outcomes and retention rates for D/d/HH college students in OLEs.

- Identify best practices and policies specific to the intersectional identities of college students with hearing difficulties within OLEs correlated with gender, race, language, ethnicity, and other disabilities, which may lead to a higher level of marginalization and oppression (Leigh et al., 2020; Nicodemus et al., 2021; Renken et al., 2020).
- Quantitative study of college students with hearing difficulties within OLEs using a large sample size.
- Examine the relationships among factors that may affect the performance of college students with D/d/HH in the OLE, including having a medical diagnosis, emotional difficulties, family support, and perceptions among college administrators, disability services, and faculty towards students with difficulty hearing within OLEs.

Conclusions

In closing the literature gap, this qualitative, descriptive study showed that underrepresented college students with unique hearing difficulties must consistently access communication within OLEs (Butler, 2019; Counselman et al., 2020). College students' ability to advocate for accommodations depended on positive external support within the multidimensional educational system. However, all the participants in this study were ignored, delayed, or denied one or more hearing assistance technology or resources.

The participants preferred the availability of simultaneous hearing-assisted technology and resources to meet their unique hearing needs that varied among contexts (see Table 2). Hence, none of the participants described disability services as consistently supportive, available, and effective (Tee Table 2). As described below, the 15 participants identified the number of times hearing-assisted devices, technology, or resources were supportive or unsupportive.

Table 2

Participants' Identification of Supports and Resources in the Online Learning Environments

	The number of times support was provided	The number of times support was not provided	The number of times support was sometimes provided
Disability Services		10	2
Video recording	2	1	11
Transcriptions			15
Sign-language interpreter		3	5
Captions/subtitles/ Communication Access Realtime Translation (CART)	2	2	5
Hearing aids/ Headphones/ Amplify	7	1	3
Visual aid			6
Online chat	2	2	5
Professor support	3	3	9
Peer support	12	1	
services		10	2
IT (Internet Technology	1	2	3
College administrators/ policies		6	
Support outside the classroom online/library		5	6
Multiple supports Simultaneously	1	8	

The research findings aligned with the theoretical framework of audism and supported perceptions that audism attitudes towards the D/d/HH college student population create barriers to accessing effective technology hearing devices or resources. The lack of accessibility was perceived as negatively impacting students' ability to self-advocate, level of engagement, and

emotions. Today, many college students with D/d/HH still struggle with audism without an inclusive, equitable, and universal multidimensional educational learning environment. A better framework for addressing the needs of D/d/HH students in OLEs may be connectivism. Connectivism's four fundamental principles provide a supportive and collaborative multidimensional educational system for learning: autonomy, connectedness, diversity, and openness, dependent on connecting individuals within systems or networks **(**Bali & Caines, 2018; Corbett & Spinello, 2020).

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Appendix A: Interview Protocol: Modified version of the LIFE-R section called *After LIFE*

(Nelson et al., 2020)

Introduction

- A brief description of online learning environments, as any course, is taken online or as part of the course taught online.
- A brief description of D/d/HH as any difficulty with hearing or understanding the pronunciation of words.

Question 1

Describe your hearing experiences within online learning environments.

a. Tell me some of the hearing experiences you had with online courses or courses taught online?

b. How many years of experience have you had within OLE? How would you describe those experiences?

c. Think about your overall hearing experiences within online hearing environments. Can you describe them to me?

d. Are there any experiences that stand out to you in particular? Why?

e. What were the most effective methods you used to hear instruction better?

f. What approaches have you been happy or unhappy with, why?

Research Question 2

Describe how your hearing needs have been supported within online learning environments?

a. As you think about these experiences, how were your hearing needs supported? Where did you experience gaps in that support?

b. Are there other examples you might have for me about how your hearing needs have been supported within the online learning space?

Research Question 3

Describe how your hearing needs have been unsupported within online learning environments?

a. What do you do if it is too noisy or has background noise within the online learning environment?

b. What did you do when you did not hear the professor?

c. What do you do when you cannot hear other peers?

d. What do you do if listening technology is not working?

e. Are there other examples where your hearing needs were not supported? Please describe them to me in as much detail as you feel comfortable sharing.

f. What did you do when you did not hear the professor?

g. What do you do when you cannot hear other peers?

About the Authors

Dr. Tracy LaChapelle, Ed.D., is a trauma-informed Licensed Professional Counselor (LPC) within a sole-proprietor therapeutic private practice; LaChapelle abides by the Health Insurance Portability and Accountability (HIPAA) privacy and confidentiality law. The American Counseling Association (ACA) code of ethics requires yearly continuing education units (CEUs) training to minimize personal bias and improve clients' therapeutic relationship experiences. LaChapelle's personal experience as a doctorate student with D/d/HH led to the motivation and passion for this research study. LaChapelle reported experiencing hearing difficulties and often being misunderstood in administrative employment and academic in-person and online college learning, similar to the challenges the participants expressed in this study. As a result, LaChapelle continues to advocate and increase awareness for underrepresented and marginalized populations by pursuing further research and conferences on the topic; last June 2023, she presented at the Poster of the Year at National University and is currently the Commissioner on Disabilities in her town. Dr. Tracy LaChapelle can be contacted at DrT.LaChapelle@gmail.com for inquiries about this study.

Deborah Nelson, Ph.D., served as the dissertation chair for Dr. LaChapelle. She is the Academic Program Director of the EdD program at National University. In addition, she has had extensive experience conducting research, providing consultation support, and teaching in the area of special education with regard to students who have diverse learning needs in a variety of learning environments. She is passionate about finding and implementing equitable and innovative solutions for students in OLEs.

