

Student and Teacher Perspectives of Learning ASL in an Online Setting

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ABSTRACT

American Sign Language (ASL) classes are typically held face-to-face to increase interactivity and enhance the learning experience. However, the recent COVID-19 pandemic brought about many changes to course delivery methods, primarily resulting in a move to an online format, which had to occur in a short timeframe. The online format has presented students and teachers with many opportunities and challenges. In this experience report, we reflect on the student and teacher perspectives of learning ASL in an online setting. We use our experience to introduce new online ASL class guidelines, videoconferencing improvements, and suggest where future research is needed.

CCS CONCEPTS

• **Human-centered computing** → **Accessibility**.

KEYWORDS

Education, e-Learning, Deaf and Hard of Hearing, ASL

ACM Reference Format:

Garreth W. Tigwell, Roshan L. Peiris, Stacey Watson, Gerald M. Garavuso, and Heather Miller. 2020. Student and Teacher Perspectives of Learning ASL in an Online Setting. In *The 22nd International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS '20)*, October 26–28, 2020, Virtual Event, Greece. ACM, New York, NY, USA, 6 pages. <https://doi.org/10.1145/3373625.3417298>

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ASSETS '20, October 26–28, 2020, Virtual Event, Greece

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ACM ISBN 978-1-4503-7103-2/20/10...\$15.00

<https://doi.org/10.1145/3373625.3417298>

1 INTRODUCTION

American Sign Language (ASL) is used by more than 500,000 people [10] and more than 100,000 people are learning ASL [11] as a language. We are based in Rochester, New York, which has a large presence of Deaf and Hard-of-Hearing (DHH) people. This is because Rochester is home to the National Technical Institute for the Deaf (NTID).

NTID is one of the world's first and largest technical institutions for DHH people [13] and it is co-located with the Rochester Institute of Technology (RIT). The learning opportunities provided by these institutions attracts a large number of DHH students. This makes Rochester the largest DHH population in the USA for 18-64 year olds [18] and the campus community at RIT presents a unique experience of DHH individuals working alongside hearing individuals. RIT faculty and students can take classes at NTID to learn ASL, which facilitates better communication on campus. Faculty and staff can opt to learn ASL through the Faculty and Staff Sign Language (FSSL) program. Typically, these courses are delivered in face-to-face classrooms with a Deaf instructor and hearing faculty/staff as the students. Only the first class of the entry level ASL 1A course has an interpreter, with all remaining classes taking place entirely in ASL.

The recent COVID-19 pandemic brought upon many rapid changes to course delivery methods. This resulted in the current face-to-face classes shifting to live online delivery methods. The new online delivery methods were done via the professional version of the Zoom videoconferencing software (<https://zoom.us/>) as it was available to all faculty, student and staff members of the institute. We used versions 4.6.8 through 5.0.2 of the Zoom software.

We use this report to share our experience of engaging in ASL classes online. The perspectives given are from faculty with less than a year learning ASL and the instructor teaching those classes. We use our experience to introduce new online ASL class guidelines, videoconferencing improvements, and suggest where future research is needed.

2 BACKGROUND

ASL is a comprehensive visual language that includes its own grammar, use of facial expressions, and regional variations [4]. DHH people who use ASL will visually acquire information and must quickly switch their attention while simultaneously processing information among multiple visual perspectives. As a result, the necessary focus can lead to overtaxing cognitive resources and can hinder learning, problem solving and reasoning for DHH students [9].

Prior work has sought to address the challenges faced by DHH students with the design of new technology. Providing DHH students with a compact presentation of important segments in a classroom scene is preferred over a single-view of the classroom [9]. This is because cognitive load occurs when DHH students divide their attention between multiple, simultaneous visually-dispersed sources of information. Cavender et al. [1] also discuss the visual attention challenge for DHH students and proposes an app-based solution for gathering all visual sources of information into a single screen and using notifications to improve student performance on content questions.

In a 2019 study that examined the relationship between what is signed, how it related to facial expressions, gestures, and postures, as well as when and where eye contact and gaze occurred during conversations, videoconferencing was found to be effective for ASL users who rely solely on visual avenues for communication [7]. However, while videoconferencing systems do pull all information onto the same screen, much like the solutions discussed previously, they do not convey eye-contact correctly as a single-camera view is broadcast to all other participants simultaneously [16]. This disrupts the usual cues for turn-taking, particularly for DHH people who must focus on the interpreter rather than the speaker, which may cause them to miss other subtle turn-taking cues such as subtle sounds or gestures. DHH people also use gestures such as waving their hand or tapping on their knee to facilitate turn-taking, but camera angle and field of view as well as video quality can make these gestures easier to miss [2]. Researchers have proposed various solutions to support turn-taking for DHH participants, such as light effects [5] or a waving hand [8].

Video quality in videoconferencing software that is sufficient for speaking participants can be insufficient to support sign language [17]. In particular, non-manual markers such as facial expressions are as important as gestures in sign language, but often low-quality video due to lighting and network issues coupled with framing issues due to distance from the camera made it difficult to understand signs [15]. Additionally, group discussions were challenging in these videoconferencing systems because the distance necessary to include the whole group made signs difficult to see.

The previous work is important, however, it focused on DHH people who are experienced signers. Learning a new language can be particularly hard at the early stages when a person is building the foundation of understanding a new grammar and other differences to their native language [6, 14]. With the number of people learning ASL we feel it is important to also understand their experiences, which may result in a unique set of requirements to maintain successful learning in an online environment. A 14 year-old case study [3] did investigate learning ASL via videoconferencing but

Tag	Name	Type	Course
S1	Gerry Garavuso	Student	ASL 1A & 1B
S2	Roshan Peiris	Student	ASL 1A
S3	Garreth Tigwell	Student	ASL 1B
S4	Stacey Watson	Student	ASL 1B
T1	Heather Miller	Teacher	ASL 1A & 1B

Table 1: We provide a summary of background details about the authors of this paper in relation to the the ASL classes. Each person is given an ID. The online ASL 1A class consisted of 10 students in total (15-20 before moving online) and the online ASL 1B class consisted of 3 students in total (5 before moving online).

our experience differs in several ways. The previous study was an advanced level ASL course, purposely designed to include multiple angle video, and involved a mixture of in-class and remote students who were allowed to talk.

Online ASL classes help to maintain social distancing and also provide people who may not have local access to ASL with an opportunity to learn the language, and so online ASL classes could increase. We can apply our findings to ensure that the learning experience is kept to a high standard and to support people learning ASL who wish to communicate with DHH people in their native language.

3 EXPERIENCES

Our report provides insights into the experience of engaging in both small and large beginner ASL classes that suddenly transition from an in-person to an online format. We recognize that other online ASL class formats might have mitigated some of the issues we experienced, but there was little time to prepare appropriately for remote learning. We are sharing our experience with the aim of helping future online classes prepare better.

Table 1 summarizes the team who put this experience report together. Our decision for the team was as followed: S1 was the only student who had the unique position of attending both courses, S2-4 were the only HCI and accessibility researchers learning ASL, and T1 was our Deaf instructor who taught both classes.

We collected feedback from this team through a weekly questionnaire once the classes had moved online. The questionnaire would encourage us to record issues close to when they happened to avoid forgetting details. In addition, we conducted a team meeting using the data as a prompt to discuss the observations and experiences further. Next, we iteratively reviewed the data to identify categories. These categories were then collated into four main themes: Environmental Factors, Hardware & Connectivity Constraints, Experience Using Zoom, and Pedagogy.

3.1 Environmental Factors

Working remotely meant that each of our own home environments were part of the collective experience and caused difficulty during online classes. In anticipation of the change to online, T1 did prepare her home environment for online teaching such as using a background to obscure distractions.

ASL is a visual language and sign perspective is an important part of the learning experience. Our in-person class seating was a horseshoe design to maximize each other's visibility, yet we lost this when moving online. It was difficult to observe signing from different angles and to determine use of space (e.g., gesturing backwards to signify past events) since we are looking at 2D images on a screen. We found a trade-off between sitting far enough away from the computer to capture the full range of signing and close enough to see others in small screens. Beginner ASL learners are likely to make mistakes when setting up at home. S3 focused so much on framing the webcam to include his hands and torso, that he forgot the importance of facial expressions and eyebrows, which are important non-manual markers in ASL.

Lighting and sound were also challenges. Dark or bright environments, exacerbated by cheap webcams, made the granular details of ASL difficult to perceive. S1 and S4 also mentioned issues with experiencing screen reflections on their glasses. S1 suggested *"if everyone had a dark background and wore dark clothes, that would probably have helped"*. There can be many sources of background noise. With people online in many locations it increases the chances of noise and they can forget to mute audio or if they are Deaf will not hear the sound. It is disruptive when trying to observe another person signing and Zoom focuses on where sound comes from. Noise in the environment may also be outside of class participants' control (e.g., construction work) and adds distraction when trying to learn a new language.

3.2 Hardware & Connectivity Constraints

All students experienced at least one occasion of cancellation of classes due to issues with T1's internet connection as well as slow/buffering video. S1 and S2 mentioned that sometimes the video would freeze and then suddenly jump ahead. In one instance, S1 had to leave early but his connection to the call would reconnect several times causing S3's participant view to rearrange each time and disrupt observations of signing.

S2, S3, and S4 used laptop screens for the class, whereas T1 and S1 used external monitors. Small screens affected the way participants are arranged in the Zoom window and made it difficult to distinguish signs and finger-spelling or small text during screen sharing. Even with an external monitor, T1 found participant videos to be too small when the class size was larger. Furthermore, while a second, larger, monitor can improve readability, it exacerbates the eye contact problems since the speaker appears to be looking away and this disrupts the turn taking cues (S1). S1 also realized that getting T1's attention could be difficult when she moved the students to another display while sharing her slides. When signing using two monitors there is also a risk of breaking eye contact to look at the other display (S1).

3.3 Experience Using Zoom

Although we focus on Zoom, we expect this experience to generalize to other systems – especially when people are unfamiliar with the software. RIT did not provide access to Zoom before COVID-19 and we were all unfamiliar with the software. This unfamiliarity and lack of experience using Zoom increased our cognitive load in a context where we were already using a lot of our attention to focus

on learning a new language. In the earlier days of our classes being online we lost time due to understanding the logistics of Zoom in this unique setting that relied on signing and no sound. T1 also found it challenging to help resolve technical issues for students with limited experience with Zoom.

Zoom is designed with hearing users in mind. As such, this section focuses on the layout design of Zoom and how it impacts students and teachers of ASL classes. Zoom will draw attention to participants when sound is detected. However, this does not work in an immersive ASL class where talking is prohibited. T1 also noted this in her comments when she mentioned that it was difficult to gain attention and take turns in an online environment. We learned during our in-person classes about getting a DHH person's attention through waving the hand. Students in online classes cannot easily determine whose attention is being requested and so T1 would get the attention of everybody followed by signing a person's name. However, there were still instances where we would default to pointing since it is a hard habit to break. Zoom offers a raise hand feature, but it cannot be used by the host or any co-hosts.

Zoom has several viewing modes and it is possible to lose the visuals of other people, which is a big challenge since we communicate through ASL instead of voice. Zoom prioritizes the host's video and each student's video appears at the top in the gallery view. T1 was initially unaware that the participant arrangement layouts are different and this resulted in confusion among students when pointing was involved. Important settings to adjust viewing are hidden and can hinder the learning experience (S3). Toggling the videos on and off also changes the arrangement which was challenging (S4). T1 further added to this indicating that Zoom had a steep learning curve to figure out how to manage the spotlight or even to move people around such as for breakout meetings. It is even more difficult to find people in larger classes since only so many are displayed at once (S1, S2) and small displays or screen sharing can make this worse (S2 and S4). Sometimes T1 would forget to share her screen and the class would not realize straightaway.

The chat feature is helpful for keeping track of text explanations for signs (S2, S3). This is contrasted with using a whiteboard where things would have to be erased. The text chat also provided a quick way to communicate if a student or T1 just could not make themselves understood (S4), although there is an issue where notifications from the chat can be distracting (S3). T1 indicated that chat functionality was largely helpful since she could type and could also see the students at the same time. In the physical classroom, she had to turn her back to the class to write on the whiteboard and may miss student questions until she turned around.

When technical problem arose during in-person classes, we would troubleshoot the issue in a cooperative way using our very basic knowledge of ASL, gesturing, and pointing. However, technical problem during online classes were more difficult because we only had the view of our own screen and therefore we lost this community support.

3.4 Pedagogy

T1 found it challenging to adapt her pedagogical approach to this format in the short time required. No whiteboard meant T1 edited her slides during screen sharing or used the chat. S4 found typing

directly on the slide preferable as the chat window could obscure other video feeds.

S3 felt that the savings in commute time could be used for ASL practice prior to class and both S3 and S4 noted that recognition of finger-spelled names improved. During our in-person classes students could not see ourselves signing, but S2 felt online classes provided an advantage in observing their own signing. However, the flipped image (mirror image) could be difficult to follow at times (S1, S3, S4).

A recent phenomenon called “Zoom Fatigue” [19] was amplified in the online ASL classes due to the visual nature of the ASL without any audio (S1, S2, S4). S1 noted in-person classes had the benefit of providing more natural breaks (e.g., distributing activity materials). S2 and S4 further mentioned students could move their heads around and change their gaze more during in-person classes. However, in the online ASL class, unknowingly they had been staring at a screen for the whole class time. On the other hand, S3 mentioned “*time seems to go quicker*” due to increased focus and concentration but at a cost of feeling more tired. S2, S3, S4 pointed out the instructor may notify a student through finger-spelling their name but this can be missed if the student is engaged with another student during a break-out session. Similarly, S3 also mentioned that the chat window was hard to follow while continuously watching the videos.

Paired practice also presented challenges. It was sometimes difficult to know who was working with whom when names were finger-spelled (S2, S3), though this improved with experience. S3 also noted that it could be distracting when all pairs are visible and signing. Furthermore, S3 found it difficult to get T1’s attention when she was focused on observing and/or working with her partner. All students noted the absence of the interactive games that the instructor had used for in-person classes. However, two students (S2, S4) found the online class recordings to be helpful as revision tools and as a tool for making up a class, whereas our in-person classes were not recorded.

Finally, people typically multi-tasking on computers and alerts (e.g., email) will shift their focus from the call, which can cause them to miss a critical sign. Most of us are conditioned to expect audio feedback during online meetings, and, if we get distracted, we can forget that there will not be audio to remind us to return to the window.

4 DISCUSSION AND CONCLUSION

T1 mentioned that although she liked using Zoom, she preferred teaching in the actual immersive environment. She further noted that NTID reduced maximum class sizes from 20 to 11 students as a result of challenges identified during the Spring semester. It was clear from our reflections on the transition in teaching format that our inexperience with both ASL and learning in an online environment meant we were not well equipped to deal with the situation.

4.1 Guidelines

Recently, the National Association of the Deaf (NAD) has provided guidelines to support other classes [12], however, they do not address some of the challenges we faced. Therefore, we draw on our

reflections of the experience to offer actionable advice for future classes that expands upon and add to the relevant NAD guidelines.

- **Expanded:** Find the best area at home with a solid background color, that balances suitable lighting (i.e., not too dark or too bright), and offers room to move around as needed.
- **New:** Position webcams at eye level and to the center of the screen so that you appear engaged in the conversation.
- **New:** Position yourself so that both your waist and the top of your head are included within the frame.
- **Expanded:** Choose appropriate clothing that contrasts well with your skin color to enhance visibility such as during finger spelling. Avoid distracting items like jewelry and hats.
- **New:** Provide students with instruction on key features within the videoconferencing software to optimize it for an ASL class. Ideally, students would not be complete novices with technology.
- **Expanded:** Establish agreed upon behavioral protocols such as for “turn taking” and using dual screen setups.
- **New:** Develop a habit for signing from different angles or positions to vary the view point for others in the class.
- **New:** Set up the call so that the audio for all participants is muted by default.

Our assessment of the situation from moving from in-person to online classes highlighted several challenges, however, we anticipate that there may be other issues that we did not identify since our group is small. It would be valuable for the ASSETS community to further research on this topic and expand these initial guidelines into a more comprehensive set. We anticipate that as we continue to practice social distancing during COVID-19 new findings will be uncovered as we become more accustomed to this way of learning.

4.2 Improved Videoconferencing Software

Our experience also suggests that accessibility improvements in popular videoconferencing software is still warranted.

Researchers have proposed various solutions to facilitate turn-taking such as light effects [5] or a waving hand [8] as attention-getting tools. Popular videoconferencing tools must support DHH and ASL students by implementing some turn-taking and attention-getting features that have already been proposed by researchers.

Online video chat platforms do bring most elements of the class onto a single screen much like the ClassInFocus tool [1]. However, we still experienced visual dispersion issues. Two of the ClassInFocus elements that would have helped with Zoom were avoiding changing window layout and avoiding distracting from the current focus. Zoom did not support pinning multiple videos at the same time. S1 indicated the importance of the need for an anchoring feature for participant videos to overcome some of the issues caused by dynamically reorganizing videos each time a camera turned on or off or a participant enters or leaves the room. This could involve allowing participants to drag and drop videos and pin the images without the dynamic reorganization of videos. The addition of video anchoring functionality would also help with multiple interpreters with DHH participants.

Screen layout is a previously identified challenge when looking at DHH committee members’ perspectives during mixed local and remote meetings with hearing individuals over a 2.5 year period [17].

This experience report also found video quality to be problematic, which was something our ASL learners noted as well. S3 suggested that the video speeds may be throttled by Zoom as a feature to overcome slow connection speeds since audio is typically prioritized in distance communication tools. However, this is a major limitation in the context of using signed languages.

Video quality issues were also exacerbated because Zoom does not allow you to control the size of the shared screen and the speaker screen, which is much smaller by comparison. This made it difficult to see the signs and almost impossible to see the non-manual markers such as facial expression. This also made it difficult for the instructor to pull student focus from the slides back to her and so students would miss important information by the time they realized she was signing again. One student (S1) noted that a split screen would have been helpful where there are two large images. He felt this would have allowed the class to look at the PowerPoint slide and the teacher at the same time.

Unlike the scenario depicted by Sutherland and Padden [15] where the camera captured a room full of participants, each participant had their own window and camera. However, the larger the class, the smaller would be each participant's video. Additionally, in the larger class, often these windows would spill onto a second page making it impossible to see everyone in the class. This feature made it particularly challenging in partner exercises, as indicated by a student (S3) who found it to be very distracting having all pairs of students visible on screen at once. While built-in breakout rooms are a viable solution in Zoom, the instructor did not use this feature as she was not able to check in on each pair of students without having to move from room to room. Also, in the smaller class, there were an uneven number of students and so the instructor would often pair up with a student while keeping an eye on the other conversations.

Visual notifications of content changes was essential in the Class-InFocus tool [1]. Zoom highlights where sound is coming from, but the focus does not change with signing because it is silent. The chat functionality does have a notification, but many students missed chat content because their attention was focused elsewhere and because this notification was not enough to divert their attention. Also, there was no notification when slide content changes.

Finally, for teaching ASL, it would be useful for Zoom to allow for two camera views, one that captured the frontal view and one that captured a view at a 45 degree angle to provide multiple angles on a single sign. We recognize that this may pose additional hardware costs and may increase the network load.

4.3 Where the ASSETS community should focus next

In addition to class guidelines and suggestions of how to improve videoconferencing software, we have also identified where accessibility researchers can focus future research efforts.

- Researchers can use eye-tracking to assess the differences in visual attention between DHH participants and ASL learners in videoconferencing software. We suspect that ASL learners have more trouble with visual attention, particularly when there is a high degree of visual dispersal.
- Conduct in-depth formal studies to compare student performance in online versus face-to-face ASL courses.
- Prototype and analyze videoconferencing software solutions that allow an ASL instructor to observe the class as a whole, while students practice in individual rooms.
- Explore the usefulness of locking participant images into a fixed arrangement that would be common for all involved to identify whether individuals adapt better to a shared viewpoint (e.g., looking up and to the right would signal to everyone that you were looking at the same particular individual).

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