Flipped Classroom Pedagogy
in ASL Mathematics

By Keith Westhoelter

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Many of today's teachers have successfully incorporated technology into their classrooms through digitally based approaches to student learning. However, the flipped classroom pedagogy can provide for rich experiences in the classroom as the students learn lessons at their own pace, leaving the teachers free to create fun, hands-on lessons in the classroom.

The flipped classroom model has been around since the early 2000s. This model is a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment in which the educator guides students as they apply concepts and engage creatively in the subject matter (Flipped Learning Network, 2014).

Although this instructional model has been in practice in some disciplines for many years, its recent surge in adoption is due, in part, to the availability of new technologies such as easy-to-learn screencasting software (a computer program for recording videos of lectures) and perhaps in part due to high-profile media stories, such as "Turning Education Upside Down" in *The New York Times* (Rosenberg, 2013) and "How 'Flipping' the Classroom Can Improve the Traditional Lecture" in *The Chronicle of Higher Education* (Berrett, 2012).

I began using this flipped classroom model around 2016 at the school in which I previously taught due to the enhancement of current technology equipment and the school's availability of it. While teaching multiple math classes to deaf and hard of hearing high school students, I needed to manage to keep up with all the paperwork, maintain an organized classroom, track students' various math goals annually, ensure fair distribution of materials and resources to students, and deliver high-quality education. After utilizing the flipped classroom approach, I could see that the students were better understanding fundamental math concepts—numbers, equations, computations, and algorithms as well as isolated facts and procedures. Additionally, the students' assessment scores displayed an increase, and their knowledge in their targeted math areas of weakness significantly improved. I was optimistic that the approach was successful, and I once again applied it to my classroom when I began teaching math at the

Photos by Matthew Vita and courtesy of Keith Westhoelter

Left: Using the flipped learning approach in his classroom allows Westhoelter to spend more time with students who are struggling or who have questions while allowing the more advanced students the freedom to work ahead.

Model Secondary School for the Deaf. With this flipped learning approach, the methodology helps me prioritize active learning during class time by assigning students videos in American Sign Language (ASL) to be viewed via iPads provided by the school at home, in the classroom, or outside of class.

I use this approach in my classroom to spend more time individually with students who are struggling while allowing the more advanced students the freedom to work ahead. It has wide-ranging differentiation by the level of need and capability instruction built into the math curriculum at every opportunity. There is increased opportunity for feedback from the students to help to make this flipped classroom model successful. Since class time can be spent doing hands-on work and thinking critically, I can easily spot knowledge gaps and work to address them rather than wait until test day to see how much the students understand.

Benefits of the Flipped Classroom Model

The most prominent benefit to adopting the flipped learning method is that the deaf and hard of hearing students are visual learners who rely on ASL for instruction. The students can learn more deeply and retain information better by watching the ASL videos at their own pace in a learning management system (LMS) such as Google Classroom or Schoology. They have more ownership over the learning process and receive more frequent feedback. The students can gain a complete understanding of the lessons. Additionally, flipped learning offers more opportunities to interact and learn from other students. With the math teachers' support and guidance, they solve problems and apply new concepts. It creates a more robust learning community in the classroom.

Another considerable benefit of this model is that math teachers save time in the classroom. They do not have to repeat the same lessons many times in one class period, which can be emotionally draining.

The flipped classroom reframes the role of math teachers and students, transforming student-driven learning in the classroom. It makes it more efficient for visual learners, who learn at their own pace, while making class time more enjoyable, productive, and actively

Tips for Creating a Flipped Classroom ASL Video

The process that we followed in our transition planning proved to be effective. The steps below may be helpful to others who wish to use data for planning transition in their area. To pursue effective transition planning through collaboration, we:

1. Use an iPad (minimum 64GB) with a tripod.
2. Use SMART Board software or a whiteboard.
3. Record up to five minutes at maximum.
4. Download to iMovies - basic to edit.
5. In iMovies, add a title for up to five seconds and change the video's speed if necessary.
6. Upload the file to Google Drive or OneDrive to save it.
7. Compress the file size tremendously by converting from an iMovies file to a MP4 file.
8. Insert a link or attach the file to Google Classroom or Schoology in the learning management system.

engaging for both the students and teachers. Many teachers feel that it is at the forefront of modern education today for our students.

Distance Learning

Distance learning is especially challenging for students who have to deal with learning disabilities, technology access, guidance, economic hardship, lack of motivation, Zoom fatigue, and unstable home environments. Using pre-recorded ASL videos helps the students with math lessons if and only if the students are skilled in navigating the LMS. The key to a flipped classroom's success is the students' feedback to meet their needs in general. Teachers can modify the lessons by delivering clear, explicit ASL presentations. However, on-campus, face-to-face instruction is the best educational environment for students. Additionally, it is the best social environment for students. Creating flipped classrooms is best in the school classroom setting due to technology availability and convenience.

Above: With the flipped learning classroom model, students have more ownership over the learning process and receive more frequent feedback.

Going Forward

Within the next few years, I intend to establish a tutorial library of math videos in ASL as a classroom supplement for our deaf and hard of hearing students. They will have access to the videos in a centralized place, which will help them develop skill mastery independently. The students will be able to use the videos to explain math concepts further or to study independently for standardized assessments. I have seen several websites with math resources and tips, such as the Khan Academy, Varsity Tutor, and other math YouTube resources, which are available to any hearing person. My goal is to build something similar for visual learners—deaf and hard of hearing students, specifically—so they have a more equitable opportunity to learn math.

References

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