

Consideration of Face Shields as Return to School Option^{1,2}

Face shields should be considered as an option for face coverings in order to balance safety with improved access to the curriculum.

Current Reset and Restart Concern:

EVERY student will miss learning opportunities with degraded speech signal and physical distancing¹ especially with cloth face masks

Considerations for Schools

The CDC has offered several considerations for schools to help protect students, teachers, administrators, and staff slow the spread of COVID-19. This guide provides an important framework for state and local school districts to restore a safe return to school transition. It is important to balance safety with learning access to education.²

Two important health and safety recommendations outlined in this framework present significant auditory learning barriers for ALL students (and teachers) and diverse learners (specifically students with hearing challenges).

- Cloth Face Coverings
- Physical Distancing of 6 feet and greater

Educational Learning Facts:

- School districts must provide a free and appropriate public education (FAPE) consistent with the need to protect the health and safety of students with disabilities and those individuals providing education, specialized instruction, and related services to these students³
- School officials have an obligation to avoid discrimination on the basis of disability under Title II and Section 504, while cooperating with public health authorities to ensure that students with disabilities have access to the school's education program.⁴
- Speaking and listening are the primary communication modes in auditory learning environments, where children are involved in listening activities for approximately 75% of their school day⁵
- Visual characteristics of instruction include facial expressions and lip movements that provide important contextual information about the message (e.g., emotion, emphasis).⁶

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² This is one consideration for improved access for students who are D/HH during COVID 19 reopening of schools. Additional access accommodations to support D/HH learners in classrooms and online instruction should be considered by the educational team.

- There are several factors that affect speech understanding in the dynamic classroom.
 - Acoustic factors that affect speech perception include⁷
 - Background noise
 - Signal to noise ratio
 - Reverberation time
 - Speaker-listening distance and directionality
 - Interaction of these variables
 - Visual factors that affect understanding include⁸
 - Access to full face, gestures and body movements of speaker
 - Lighting - without glare or backlighting
 - Background - solid and uncluttered background to visual face
 - Distance – must be close enough to speaker to read lips and facial cues
 - Interaction of these variables
- Learning deteriorates when students cannot hear or see the speaker clearly; listening effort⁹ and visual fatigue may further reduce comprehension. Subsequently, skills involved in auditory and visual processing and learning to read are impacted.¹⁰
- EVERY student will miss learning opportunities with degraded speech signal from face masks and physical distancing. Students with the following characteristics are at-risk for learning in poor acoustical environments;¹¹ lack of visual access further compounds learning difficulties for many of these students.
 - Young children (less than age 15 due to immature auditory brain development)
 - Conductive hearing loss/ear infections
 - Language and speech disorders
 - Learning disability or dyslexia
 - English as a second language
 - Auditory processing deficit
 - Sensorineural hearing loss (bilateral and unilateral)
 - Developmental delays
 - Attention deficits
 - Autism spectrum disorder

Barriers of Cloth Face Masks:

- Exacerbate difficulty in understanding speech by both attenuating (as much as 12dB) and distorting speech¹²
- Eliminate cues gained from lip-reading
- Eliminate access to important facial cues
- Cannot be easily or effectively disinfected
- Difficult to breathe in especially when used all day long to teach

- May require a teacher to frequently pull the mask down to effectively communicate while compromising the protection it is designed to provide

Barriers of Physical Distancing:

- Sound diminishes as a function of distance (inverse square law) decreasing at approximately 6 dB for each doubling of distance resulting in less audibility of teacher/peer's voice.
- Decreases loudness of speech which results in smearing of critical speech cues
- When combined with room noise/reverberation, further degrades speech quality

Consideration of Face Shields as Option for Face Coverings in the School Setting

A practical solution to overcome barriers of cloth face masks while keeping teachers, school personnel, and students safe is the option of wearing a face shield that meets the CDC recommendations to cover the front and sides of the face and provide barrier protection.¹³ Window masks may also be considered as an alternative to cloth masks but access to the person's mouth area for speechreading is limited by the size of the window in the mask and the style (see comparison of full cloth and window masks, and face shield below).



Pros of Face shields:

- Provides full visual access to a person's face (speechreading, facial expressions)
- Easily disinfected
- Readily available and economical
- Reusable
- Prevents wearer from touching their face
- Provides covering of eyes in addition to nose and mouth
- Comfortable to wear and breathe in
- Reinforces the importance of physical distancing

Data Support for Face shields:

Although face shields are not frequently mentioned as a face covering in guidance documents; there are articles that support the use of face shields as a viable barrier.

- When no face masks are available, the use of a face shield that covers the entire front (extending to the chin or below) and sides of the face with no face mask is an option.¹⁴

- Unlike some masks, face shields offer the ability to more effectively communicate with patients because the clear shield allows patients to see lips and full facial expressions without the need for face shield removal.¹⁵
- An Iowa study reports that although large-scale studies have not been conducted, however, in a simulation study, face shields were shown to reduce immediate viral exposure by 96% when worn by a simulated health care worker within 18 inches of a cough. Repeated student at the currently recommended physical distancing of 6 feet, face shields reduced inhaled virus by 92%.¹⁶
- Face shields may be the most well-suited facial protection option as these devices do not obstruct the mouth. Students who are deaf, hard-of-hearing, or have autism spectrum disorder must be able to see the face and mouth of their teacher.¹⁷

As schools begin discussing reopening, face shields should be considered as an option for face coverings in order to balance safety/health with improved auditory/visual access.

¹Crandell, C., Smaldino, J., & Flexer, C. (2005). *Sound-field FM amplification: Theory and practical applications* (2nd Ed). Clifton Park, NY: Thomson Delmar Learning.

² <https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/schools.html>

³<https://www2.ed.gov/about/offices/list/ocr/frontpage/faq/rr/policyguidance/Supple%20Fact%20Sheet%203.21.20%20FINAL.pdf>

⁴ <https://www2.ed.gov/about/offices/list/ocr/docs/ocr-coronavirus-fact-sheet.pdf>

⁵ Dahlquist, L. (1998). *Classroom amplification: Not just for the hearing impaired anymore*. CSUN 1998 Papers. Retrieved from: <https://files.eric.ed.gov/fulltext/ED420964.pdf>

⁶ National Association of State Directors of Special Education (NASDSE) (2018). *Optimizing Outcomes for Students who are Deaf or Hard of Hearing: Educational Service Guidelines* (3rd Ed). Available: www.deafedguidelines.com

⁷ Smaldino, J., et al. (2009). Room acoustics and auditory rehabilitation technology. In J.Katz et.al. *Handbook of clinical audiology* (6th Ed.). Baltimore MD: Lippencott Williams & Wilkens.

⁸ National Association of State Directors of Special Education (NASDSE) (2018). *Optimizing Outcomes for Students who are Deaf or Hard of Hearing: Educational Service Guidelines* (3rd Ed). Available: www.deafedguidelines.com

⁹ Hornsby, B., Werfel, K., Camarata, S., & Bess, F. (2014). Subjective fatigue in children with hearing loss: Some preliminary findings. *American Journal of Audiology* 23, 129-134.

¹⁰ Smaldino, J., & Flexer, C. (2012). *Handbook of acoustic accessibility*. New York, NY: Thieme.

¹¹ Crandell, C., Smaldino, J., & Flexer, C. (2005). *Sound-field FM amplification: Theory and practical applications* (2nd Ed). Clifton Park, NY: Thomson Delmar Learning.

¹² Goldin, A., Weinstein, B., & Shiman, N. (2020). How do medical masks degrade speech reception? Retrieved June 4, 2020.

Available: <https://www.hearingreview.com/hearing-loss/health-wellness/how-do-medical-masks-degrade-speech-reception>

¹³ <https://www.fda.gov/media/136842/download>

¹⁴ CDC. Strategies for Optimizing the Supply of Facemask. Published online March 17, 2020. Available:

<https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/face-masks.html>

¹⁵ Bankaitis, A.U. (2020). Infection Control Anxiety: Acceptable Alternatives to Critical Supplies. Updated May 6, 2020. Available:

<http://aubankaitis.com/infection-control-anxiety/>

¹⁶ E.J. Mundell. (2020). Face shields a more effective deterrent to COVID? Published online April 30, 2020. Available:

<https://www.webmd.com/lung/news/20200430/face-shields-a-more-effective-deterrent-to-covid#1>

¹⁷ Matone, R., Marshall, P., et.al.(2020). *Policy Review: Evidence and Considerations for School Reopenings*. Children's Hospital of Philadelphia. Retrieved on May 28, 2020. https://policylab.chop.edu/sites/default/files/pdf/publications/PolicyLab-Policy-Review-School-Reopenings_0.pdf