Chapter 6
Training Special Education Teachers Through Computer Simulations: Promoting Understanding of the Experiences of Students with Disabilities

Jelia Domingo and Elizabeth Bradley

6.1 Introduction

In the twenty-first century, teachers are expected to do it all. K-12 teachers must be well versed in physical, intellectual, and social/emotional child development while being able to effectively instruct typically developing students as well as those who are at-risk and those with a wide range of disabilities; at the same time, they are expected to improve student achievement and utilize culturally responsive instructional techniques (Beare, Marshall, Torgerson, Tracz, & Chiero, 2012; Peterson-Ahmad, 2018). It is imperative for teacher preparation programs to train teachers in how to effectively instruct diverse learners (McDonald, Kazemi, & Kavanagh, 2013). Yet, preservice training and hands-on experience in instructing students with disabilities are limited; many new teachers report a lack of sufficient training in working with diverse students (Kokkinos, Stavropoulos, & Davazoglou, 2016). The demand for special education teachers rises as the number of students diagnosed with disabilities also rises; thus, teacher preparation of special education teachers is of particular importance (Tyler & Brunner, 2014).

An essential part of teacher preparation programs is opportunities for the practice of complex teaching skills that resemble real-life classroom scenarios (Grossman & McDonald, 2008). To successfully prepare preservice teachers to teach increasingly diverse groups of students, teachers must be exposed to frequent and repetitive classroom experiences to practice these skills (McKleskey et al., 2017). However, budget and time constraints make ample opportunities for practice difficult (Bradley

J. Domingo (✉) · E. Bradley
School for Graduate Studies, SUNY Empire State College, Latham, NY, USA
e-mail: Jelia.domingo@esc.edu; elizabeth.bradley@esc.edu

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& Kendall, 2014). Simulations can help provide a solution to this problem. They can provide a safe and controlled environment for teachers to engage in frequent practice and receive immediate feedback (Dieker, Hynes, Hughes, & Smith, 2008; Vince Garland, Holden, & Garland, 2016).

Simulations can be used to help learners acquire a level of understanding and skill that would not otherwise be possible (Colwell, 2013). Within the field of special education, simulations have been utilized to change negative teacher attitudes, which can sabotage efforts to provide a positive and effective learning environment for students (Corkett, 2017). Researchers have utilized simulations to help teachers gain empathy for their students with disabilities. Results indicated that the experiences increased awareness of the negative impact of disabilities on their students and allowed teachers to understand their past assumptions, thereby increasing empathy toward students with disabilities (Colwell, 2013; Corkett, 2017). Simulations have also been useful in helping teachers learn to identify students with learning disabilities (Broadbent & Meehan, 1971).

This article discusses the role that simulations could have in educator training across a number of different disabilities. Although the focus of simulation training is often on preservice and new teachers, paraprofessionals and other educators, as well as school staff, bus drivers, recess monitors, etc., could also benefit. Indeed, paraprofessionals have a gap in knowledge related to effective classroom management and disability-specific symptoms and interventions (Ramos, 2017). Thus, in this article, information on disability prevalence, symptoms, and interventions are discussed as well as simulations that have been developed to provide insight into the particular disability. Recommendations for training and practice are also included.

6.2 Social/Emotional Disorders

Social and emotional disorders are common among middle and high school students. Roughly 20% of adolescents have a diagnosable mental health disorder such as anxiety or depression (Salle et al., 2018). Adolescent suicide has increased roughly 25% over the last 15 years, and suicide is the second leading cause of death among adolescents in the USA (CDC, 2018). Teacher awareness of social and emotional disorders is integral to student safety and success, and, in order to promote effective learning, schools must be a safe place for students.

Teachers are in a position to recognize troubling behaviors in their students as they see them for a significant amount of time each day (Rutledge, Rimer, & Scott, 2008). A positive perception of school climate, which teachers can largely impact, is associated with less suicidal ideation and behaviors (CDC, 2014; Salle, Wang, Parris, & Brown, 2017). The level of connection that students feel with their school impacts the likelihood that they will engage in suicide-related behavior. Students are more likely to connect with teachers if they feel they are empathetic, caring, and supportive (Underwood, Springer, & Scott, 2011). These positive relationships help reduce the negative effects of social and emotional disorders on student success

(Holen, Waaktaar, & Ase, 2018). However, students with social and emotional disorders often experience less supportive teachers; thus, interventions that can improve teacher-student relationships can be helpful (Holen et al., 2018).

Simulations of depression and anxiety can help teachers understand the experiences of their students who have these social and emotional disorders, thereby increasing empathy and leading to a more positive student-teacher relationship. Alessandro Salvati created a simulation entitled Anxiety Attacks, which takes the user through the experience of having a panic attack (Salvati, 2015). A walk in the woods goes from a beautiful sunny day to a dark and cold place with negative thoughts, difficulty breathing, visual disturbances, and fear of dying. The user experiences how negative thoughts can escalate and manifest in physical symptoms until they may feel that they are dying. This simulation is not recommended for youth as the experience of playing it can be frightening. However, it gives an approximation of the frightening experience of a panic attack and how to control it through measured breathing, which is one of the goals or commands of the game (Salvati, 2015). Playing this simulation will help teachers whose students suffer from anxiety disorders to understand how their symptoms can escalate, leading to increased empathy and comprehension of effective de-escalation techniques (Fig. 6.1).

Quinn, Lindsey and Schankler (2013) developed a simulation entitled Depression Quest. The interactive game takes players through different scenarios of a person with depression. The scenarios include those encountered in daily living, such as going to work, spending time with friends and family, and watching TV. It also includes social situations that can be difficult to navigate as well as some sessions during brief treatment with a therapist. Each scenario has a detailed description of the situation and, at its end, several choices about how to respond. At the end of each scenario, there is a reminder of the symptoms of untreated depression (Quinn et al.,

Fig. 6.1 Scene from *Anxiety Attacks* (Salvati, 2015)

2013). The game helps foster an awareness of depression, including signs, symptoms, and treatment options. Teachers who utilize this simulation will gain an increased understanding about their students who struggle with depression. In particular, the lack of motivation those students may have as well as truancy, anxiety, and difficulty with social interactions will become more understandable, resulting in increased empathy for those struggling with depression as a result of playing this game.

6.3 Autism Spectrum Disorder

Autism spectrum disorder (ASD) occurs in about 1 out of every 59 children in the USA and is four times more likely to be identified in boys than girls (Baio et al., 2018). It is known as a spectrum disorder because of the range of symptoms and abilities that occur in those who have been diagnosed (Ryan, Hughes, Katsiyannis, McDaniel, & Sprinkle, 2011). ASD is a developmental disorder characterized by deficits in social communication in addition to restricted, repetitive behaviors and interests, limited eye contact, resistance to change, and high sensitivity to sensory stimuli (Baio et al., 2018; Ryan et al., 2011). Deficits in social communication are caused by the inability to discern social cues such as facial expressions and body language, as well as difficulty processing spoken language (Friedlander, 2009). A highly sensitized central nervous system often makes individuals with ASD overly sensitive to touch, light, taste, or smell (Friedlander, 2009).

Along with a range of deficits, individuals with ASD have a range of intellectual abilities and proficiencies (Ryan et al., 2011). For those considered to have high functioning autism, deficits can be masked by high IQ scores and above-average skill areas, sometimes leading teachers to expect overall higher performance than students are capable of due to the confounding factors related to their masked deficits (Polischuk, 2016). Thus, it is important that teachers have training and understanding regarding the general needs of students with ASD as well as knowledge of the specific strengths and needs of the particular students who may be placed in their classes (Friedlander, 2009). Several studies have found that "even teachers of recognized professional competence often consider themselves less able to deal with [autistic] students than with those with any other form of special needs" (Rodriguez, Saldana, & Moreno, 2011, p. 1). Therefore, trainings that educate teachers regarding the needs of students with ASD and dismantle misconceptions concerning autism are essential for helping teachers gain more knowledge and confidence in meeting the needs of those who may be placed in their classes. To this end, simulations can serve as useful tools to assist teachers in gaining a deeper understanding of how students with autism experience the world and, consequently, how to make the classroom environment more welcoming to students with ASD.

Szczerba (2017) wrote an article that includes text and YouTube videos to help readers understand the experience of autism. The videos included were created by various individuals, many of whom have autism, and simulate the experience of

sensory overload. The loudness, repetitiveness, and brightness of auditory and visual stimuli are the general focus of most of the videos. Three of the videos additionally attempt to demonstrate the emotional reactions to these stimuli, which are more difficult to simulate for an observer. The videos help to explain why these stimuli are annoying and frustrating for those with autism. The videos also help demonstrate the chain of events and lack of ability to communicate that can lead a person with autism to become overwhelmed by the fight or flight response.

The autism simulator created by Spoza (2019) uses Oculus software and hardware (headset) to guide users into a more comprehensive virtual experience as their own surroundings are replaced by the sights and sounds they experience through the immersive virtual reality environments presented. Users are guided through the visual and auditory simulations as if they were individuals with autism engaging in mundane tasks such as sitting in a coffee shop, sitting in a desk in school, or waiting for and riding a tram. This simulator can be rented for various lengths of time, and an Oculus Rift (headset) and Oculus-ready computer are also required to utilize the software. This product would be useful for large organizations who wish to train multiple employees or associates. It is less practical for individual teachers to utilize for their own development due to the cost and technology requirement unless the teachers are already engaged in using this type of technology for other activities as well and would therefore have an additional use for the equipment (Fig. 6.2).

These autism simulations can be useful to teachers because they help to contextualize the emotional responses of students with autism. Understanding how seemingly small stimuli are being seen and heard by those with autism can help a teacher design a learning environment with fewer unnecessary distractions and therefore increase an autistic person's time on task through environmental interventions.

Fig. 6.2 Scene from *The autism simulator* (Spoza, 2019)

6.4 Attention-Deficit/Hyperactivity Disorder

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder characterized by inattention, hyperactivity, and impulsivity that may be the result of genetic, biological, or environmental factors (Kaypakli & Tamam, 2019; Kousha & Kakrodi, 2019; NIMH, 2019). ADHD manifests in a variety of subtypes or hybrid forms; varying degrees of inattention, hyperactivity, and impulsivity cause impairment in cognitive, social, interpersonal, and academic functioning (Kousha & Kakrodi, 2019; Willcutt et al., 2012). Everyday tasks from learning to interacting with people and to driving may be affected by ADHD depending on the particular mix of inattention, hyperactivity, and impulsivity experienced by an individual (Biederman et al., 2007; Kaypakli & Tamam, 2019). These subtypes of ADHD have been identified as predominantly inattentive type, predominantly hyperactive-impulsive type, and comorbid inattentiveness, hyperactivity, and impulsiveness as combined type (Rowland et al., 2008).

In the classroom, ADHD can negatively impact students' abilities to be successful academically and socially. Inattention causes students to miss hearing instructions, misread directions, and have generally poor study skills (Jones & Chronis-Tuscano, 2008). Hyperactivity and impulsivity may cause students to behave disruptively by doing things such as calling out in class, getting out of their seats at inappropriate times, fidgeting in ways that distract others, throwing objects, or doing other similarly distracting activities (Jones & Chronis-Tuscano, 2008). Inattention can impact the ability to learn new information, while hyperactivity and impulsivity often cause people with ADHD to have difficulty communicating effectively, recognizing emotions of others, and responding appropriately in relationships (Kaypakli & Tamam, 2019).

Between 3% and 10% of students have been estimated to meet the criteria for ADHD worldwide (Jones & Chronis-Tuscano, 2008; Kaypakli &Tamam, 2019). This means that teachers, whether designated to work in regular or special education classes, will come across many students with some form of ADHD during the course of their careers and thus require training to successfully educate such students (Jones & Chronis-Tuscano, 2008). Training has traditionally occurred through graduate coursework, in-service trainings, and specialist-teacher consultations and collaborations (Jones & Chronis-Tuscano, 2008). However, simulations are also an option for educators who wish to develop an empathetic understanding of the disorder to better tailor learning environments to the needs of students who have challenges of attention, hyperactivity, or impulsivity.

One such simulation is *Through Your Child's Eyes* by Understood.org (n.d.). In this simulation, visitors can individualize the information they receive by specifying a child's challenges and grade level or select from a previously created profile. After submitting the requested information, the user watches a video of a child who describes their challenges from their own perspective. Then the user plays a simulation in which they experience tasks from the perspective of a student with a particular challenge in reading, writing, attention, math, or organization depending on which

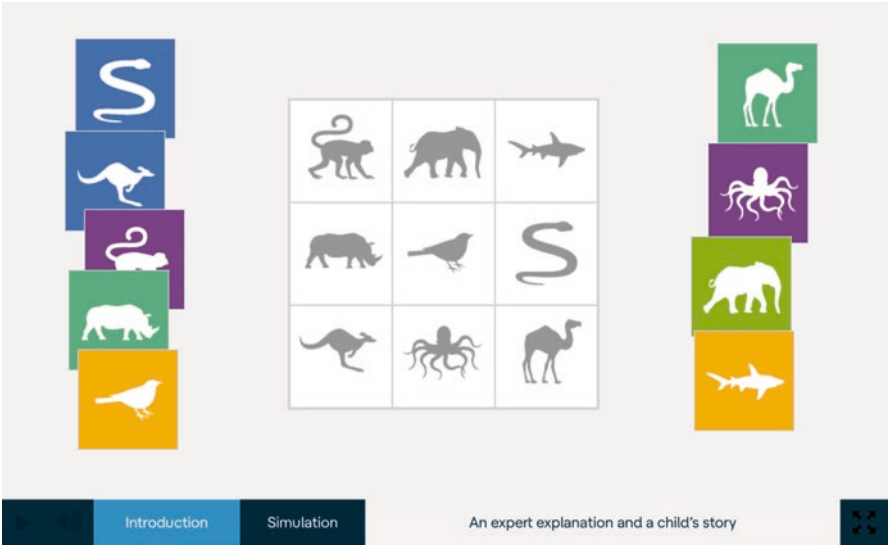

Fig. 6.3 Activity from *Through Your Child's Eyes* (Understood.org, n.d.)

category was previously selected. A teacher assigns a task for the user to complete while competing stimuli are loud and distracting in the background. Finally, an expert explains why the simulation was difficult and how the visitor's experience reflects what students face when working on such tasks. There are a few technical issues with the site that interfere somewhat with the ability to experience the simulation in the sequence it was originally meant to be experienced. However, the simulation still gives insight into the experiences of students with ADHD (Fig. 6.3).

Similarly, a blog by Elaine Taylor-Klaus (2019) links to an ADD/ADHD simulator housed on the YouTube platform. In the simulation, the user is required to read a text which moves in and out of distinct view in the midst of various auditory and visual distractions. After the presentation of the simulation, the user must answer low-level comprehension questions based on the text that was presented. The simulation serves to help the reader understand how difficult it is to keep track of details when a person lacks the ability to screen out distractions to concentrate on one stimulus above all others.

The Piowlski Disability Research website contains links to simulations housed on the PBS website, "Misunderstood Minds" (Johnson, n.d.). There are two simulations which are each dedicated to visual and auditory attention difficulties, respectively. The third link is to an interview between an education specialist and a second-grade student. In the interview, the student explains how he experiences the classroom. The attention simulation gives users the experience of working on a task while distracting competing stimuli are present.

These ADHD simulations are helpful because they support teachers in gaining an understanding of why certain tasks may be difficult for students with ADHD. Seeing how students with ADHD experience environmental stimuli is eye-opening and will

help teachers develop strategies to help students with ADHD navigate their challenges in the classroom.

6.5 Dyslexia

Dyslexia is a neurobiological condition that impacts reading fluency and comprehension due to issues with spelling, decoding, and word identification. Many general and special education teachers are not adequately prepared to educate students with dyslexia (Bos, Mather, Dickson, Podhajski, & Chard, 2001). Students with dyslexia can excel in other academic areas; thus, their difficulties with reading and comprehension can come as a surprise to their teachers. Sometimes dyslexia also hides student strengths, particularly if their issues with reading are undiagnosed. A significant proportion of educators have serious misconceptions about dyslexia and don't know how to effectively work with students with dyslexia. In addition to a need for knowledge about dyslexia, teachers need more empathy and understanding concerning the experience of dyslexic students and their daily frustrations and learning difficulties in order to provide effective instruction (Wadlington & Wadlington, 2005).

Multiple face-to-face simulations have been utilized with preservice and in-service teachers to allow participants insight into the experience of having dyslexia. One of these simulations, The Dyslexia Simulation, successfully raised participants' awareness of the limitations and feelings of students with dyslexia. Participants reported increased empathy for students with dyslexia as well as increased the likelihood of effective diagnosis of students with dyslexia (Wadlington, Elliot, & Kirylo, 2008). Likewise, Passig (2011) tested the effectiveness of VR technology on increasing educator knowledge about dyslexia and discovered that simulations were superior to trying to raise awareness through watching a film. However, this and other face-to-face simulations require class time with multiple participants and an instructor. Virtual simulations allow the experience to occur asynchronously and at the click of a button.

One such simulation, created by Victor Widell (2016), mimics the experience of a reader with dyslexia. The simulation shows the Wikipedia definition of dyslexia in movement with letter swapping and reversals. Since the experience of dyslexia differs from one individual to the next, as is the case with most leaning difficulties, this simulation does not ring true for some individuals diagnosed with dyslexia. However, the resulting struggle to read text due to the simulation gives the reader a sense of the difficulty and frustration that dyslexia can lend to reading fluency and comprehension. The sense of confusion and frustration that typical readers will experience while viewing the simulation will aid educators in developing comprehension and empathy for the struggles of students with dyslexia (Fig. 6.4).

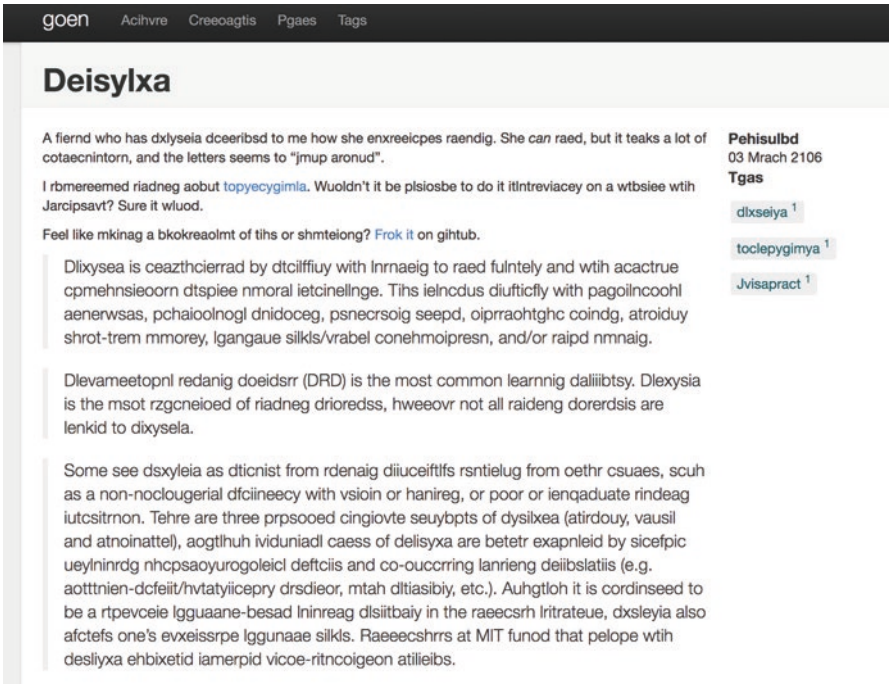

Fig. 6.4 *Dyslexia* (Widell, 2016)

6.6 Visual Impairments

For students with visual impairments, disabilities ranging from low vision to total blindness, the ability to learn incidentally from their environment is limited (Texas Council for Developmental Disabilities, 2013). Roughly 80% of what typically sighted children learn is through visual cues. Touch and hearing do not fully compensate for visual impairments in the classroom environment; thus, without adequate accommodations, social, motor, language, and cognitive development can be negatively impacted. Instructional strategies are integral to student growth, such as consistent organization and structure, fostering independence, and assistive technology including computer adaptations, adaptive devices, and optical devices (Texas Council for Developmental Disabilities, 2013). However, many students with visual impairments don't utilize assistive technology that would be beneficial throughout their school trajectory, largely because of lack of teacher knowledge, confidence, and training about how to utilize the devices (Zhou, Parker, & Smith, 2011).

Low vision simulations have been utilized to help impact the perceptions of sighted people. Boumenir, Kadri, Suire, Mury, and Klinger (2014) had adults search through rooms for targets using low vision simulators, and results indicated that sighted participants learned how difficult it is to perceive and move with limited vision. In addition, Juniat et al. (2019) utilized a simulation-based training to simu-

late visual impairment and understand its impact on medical patients. Results indicated that students grew in their knowledge of the challenges of being visually impaired and how to adapt their behavior toward these patients. They concluded that low visual simulations can help increase empathy among sighted people for those who are visually impaired.

The use of low vision simulators with special education teachers in the classroom setting has not been well documented. However, Zimmerman (2013) created a low vision simulation kit for this purpose. The low vision simulator kit has been used at ADA sensitivity trainings by numerous organizations, as professional development for occupational therapists and other educators, and with students to help them empathize with their peers (Zimmerman Low Vision Simulation Kit, 2013). Wearing simulation goggles allows users to experience low vision, vision impairments, and legal blindness. Eleven lenses and funnels are included in the kit, which can be used by four people at once. Lenses and funnels can also be combined to create different types of visual impairment including different types of visual acuity, peripheral field loss, macular degeneration, cataract, scotoma, and hemianopsia (Zimmerman, 2013).

These visual simulations can help teachers understand the challenges that students with visual impairments experience daily. Zimmerman's website includes simulation activity ideas to be used with the goggles to help safely amplify the experience and assist the user in developing empathy and planning future modifications for those with visual impairments (Zimmerman, 2013).

6.7 Hearing Impairments

The term "hearing impairment" refers to a spectrum of hearing loss generated from a variety of causes. Depending on the cause as well as the severity of the condition, a person may have partial to complete hearing loss. Terms to describe the various conditions of hearing impairment include "(central) auditory processing disorders, auditory neuropathy, and King Kopetzky syndrome (obscure auditory dysfunction)" (Neumann & Stephens, 2011, p. 44). Practically, terms such as mild, moderate, and severe may be used to communicate to teachers and other lay readers concerning the impact of the hearing impairment under discussion. Hearing-impaired individuals may also be referred to as deaf or hard-of-hearing to further specify the extent of their impairment (Holt, 2019).

As implied above, the range of the severity of hearing impairment may dictate the level of intervention required by students. Deaf and hard-of-hearing students depend more on visual perception than normal-hearing peers (Bratu, Buica-Belciu, & Caraman, 2018). Therefore, while those with mild impairment may sit closer to the teacher to make sure they hear instruction, others may require that instructions and lessons be in some visual form, including written instruction, sign language, or

subtitles when watching videos. Still others may require assistive technology such as cochlear implants or a variety of hearing aids with various accessories that may be used in the classroom such as microphones for teacher use and devices which diminish background noise (Holt, 2019). Students may also use residual hearing, lip reading, and sign language to communicate and function within the class setting (Ting & Gilmore, 2012).

Teachers of students with hearing impairments have varying degrees of knowledge on how to best accommodate their students. Teachers of deaf and hard-of-hearing students who are in segregated special education settings often receive specific training in sign language as well as teaching techniques that are specifically known to be effective for hearing-impaired students. However, teachers in inclusive settings who have not targeted their studies on understanding how to teach hearing-impaired students may struggle more to understand the needs of hearing-impaired students learning in the midst of a hearing population (Ntinda, Thwala, & Tfusi, 2019). General education teachers are the target audience for much supplementary training since many have not received such specific training during preservice teaching experiences. Many studies have found that lack of teacher training is a main contributing factor in negative attitudes toward teaching students with disabilities (Colwell, 2013; Uko, 2018).

Simulations have been used to enhance the understanding of deaf and hard-of-hearing individuals by teachers and other hearing stakeholders. The main tactic of these simulations is to help hearing people experience sound as their deaf and hard-of-hearing peers. Some examples of online simulations are found on Success for Kids with Hearing Loss (2016), Hearing Like Me (Phonak, 2013), and Starkey Hearing Loss (n.d.).

The Success for Kids with Hearing Loss (2016) website contains videos and audio clips demonstrating various degrees and types of hearing loss, the results obtained from various hearing types of microphones, wireless devices, and the experiences of individuals in classrooms, stores, and restaurants when they do and do not have the appropriate listening devices available to them. Success for Kids with Hearing Loss (2016) also provides resources specifically useful for classroom teachers.

Hearing Like Me (2013) includes a hearing loss simulator dedicated to helping hearing people understand the experience of hearing loss. Normal, mild, and moderate audio samples are available for a visitor to browse how various types of sounds are heard by people with various levels of hearing ability. These sounds are divided into categories such as speech, environmental, music, and background noise, and there are 48 audio clips on the simulator page.

Starkey Hearing Technologies (n.d.) is a hearing clinic which has a page dedicated to simulating what mild, moderate, and severe hearing loss are like. The audio clips simulate various levels of hearing in a conversation, meeting, listening to music, shopping, talking in a car, crowd, and restaurant.

These hearing loss simulators can be utilized by teachers who would like to be more aware of the way their speech and other classroom sounds are perceived by students. In particular, understanding the ways in which sounds are muffled or change with the movement of a speaker away from a person with a hearing impairment would assist in helping a teacher become more sensitive to their positioning as they speak, as well as the level of clarity and speed with which they speak.

6.8 Conclusion

The simulations discussed in this article are intended to benefit K-12 educators, both in general and special education settings. Although teachers receive some training on these topics, research findings make it clear that this training, whether received in teacher education programs or as school in-service and professional development trainings, is not adequate for skill building, competence, and confidence in effective instructional techniques. Many other school personnel come into contact with students with disabilities and receive much less training than teachers; aides, paraprofessionals, administrative assistants, bus drivers, and lunch and recess monitors are among these individuals. Simulations are a quick, accessible, and salient way to teach educators how to best interact with and instruct students with these disabilities. In addition to the need for educator training in these areas, future research on these topics is also warranted. Although many of these simulations have already been used with educators in the school setting, data were rarely collected as part of these professional development opportunities; thus, clear evidence of positive outcomes is limited. Future research would help clarify the content and parameters of simulations that educators find to be most beneficial.

The simulations in this article cover a wide variety of disabilities that educators could encounter with students in the classroom. These simulations do more than just educate teachers on the signs, symptoms, and experiences of students with these disabilities. They put teachers in the position of those students, helping them to see, hear, and feel what they do. The result is an increased understanding and empathy for students' experiences which, in turn, leads to more positive teacher-student relationships. These more positive relationships help students experience the classroom as a more positive climate, leading to less emotional distress and less of a negative impact from their disabilities (CDC, 2014; Holen et al., 2018; Salle et al., 2017; Underwood et al., 2011). Teachers who have experienced these simulations will also be more aware of the ways that they can accommodate students with disabilities in the classroom through classroom routines and organization, differentiated instruction, assistive technology, peer education, and de-escalation techniques. The result is a classroom that is more conducive to learning for all students, an outcome which benefits disabled and nondisabled students alike.

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