

CHAPTER 2

EDUCATIONAL IMPLICATIONS FOR STUDENTS WITH SENSORY IMPAIRMENTS IN INCLUSIVE SETTINGS: TIPS AND STRATEGIES

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INTRODUCTION

Inclusive education is spreading worldwide, and more students with disabilities, including those with sensory disabilities are attending general education classrooms in Turkey and the world. Kart and Kart (2021) reviewed the literature regarding the social and academic effects of inclusion on students without disabilities. Findings showed that students without disabilities also benefited from inclusive classrooms in both social and academic ways. Moreover, inclusion had mostly positive and neutral effects on students with or without disabilities in terms of academic achievement and social development.

More and more students with disabilities have been receiving education in general education classrooms in Turkey. For example, the number of students with disabilities in general education high schools in Turkey increased from 27730 to 59572 in five years from the academic year 2015-2016 to 2020-2021. Similarly, the number of students with disabilities in general education

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elementary schools in Turkey climbed from 81380 to 114991 and in general education middle schools from 92032 to 144769. With the rise of those numbers, research also has increased in the area of inclusion of students with disabilities. (MEB, 2016, 2021).

Sensory impairments are low-incidence disabilities and any type or degree of hearing loss, visual impairment, or a combination of both interferes with typical learning. Teachers play an important role in effective and successful inclusive education but many teachers are not adequately trained in working with students with sensory impairments. Therefore, this chapter aims to provide relevant information on students with sensory disabilities and ways to differentiate instruction with tips and strategies.

STUDENTS WHO ARE D/DEAF AND HARD OF HEARING

Deaf and hard of hearing (d/Dhh) students are a very diverse group of students with unique educational needs. Even teachers of the deaf may feel unprepared to teach d/Dhh students and may need guidance on a range of topics such as communication, teaching strategies, and collaboration with parents (Muskoya et al., 2017). The literature indicates that teaching techniques and strategies, classroom environment, and collaboration are the most important teacher competencies (Luckner & Carter, 2001). Unfortunately, most general education teachers have no or very limited experience working with this group. Therefore, the purpose of this section is to present an overview of advanced and controversial issues concerning the education of d/Dhh students in inclusive classrooms and to provide resources and suggestions to enhance the educational experiences of d/Dhh students. Details across a range of topics are provided: (a) definition of hearing impairment and deafness, (b) the demographics of d/Dhh students, (c) causes of hearing impairments, types, and degrees,

(d) communication and language approaches, (e) differentiated instruction, and (f) teaching tips and strategies.

Definitions

According to IDEA (2004), “hearing impairment means an impairment in hearing, whether permanent or fluctuating, that adversely affects a child’s educational performance but that is not included under the definition of deafness” (34 CFR 300.8(c)(5)), and “deafness means a hearing impairment that is so severe that the child is impaired in processing linguistic information through hearing, with or without amplification, that adversely affects a child’s educational performance” (34 CFR 300.8(c)(3)).

Demographics of Students who are Deaf and Hard of Hearing

Hearing impairment is a generic term for all degrees of hearing loss, and deafness is low-incidence disability because it does not occur in many children (Smith et al., 2015). However, the use of the phrase d/Dhh refers to all students with a wide range of hearing loss. This includes both audiological and sociocultural parameters of deafness and individuals who are members of Deaf culture.

Even though there have been some advances in the field over the last two decades through early identification and intervention, some demographics remain the same over the years as for every 1000 children born in the United States, two to three babies were identified as having permanent hearing loss (Hartman et al., 2019). Ninety-five percent of d/Dhh children are born into families with at least one hearing parent (Paul et al., 2009). Also, approximately 60% of d/Dhh students have slight to moderate or unilateral hearing loss (Trezek & Hancock, 2013), and only a small percentage of the population has severe or profound hearing loss (Paul et al., 2009).

Deaf and hard-of-hearing students are a very heterogeneous group of students. The existence of an additional disability or disabilities, functional hearing status, mode of communication, and educational placement options make this population even more diverse. One-third to one-half of all d/Dhh students have an additional disability such as learning disabilities, deafblindness, cognitive disabilities, attention disorders, and autism spectrum disorders (Spencer & Marschark, 2010). Students with or without functional hearing are two broad distinct groups that differ in language use (Paul, 2019). For example, in schools, the majority of d/Dhh students (51.4%) use speech only as their primary mode of communication; 25.6% use both spoken and sign language, and 20.2% use sign language only (The Gallaudet Research Institute, 2014). Furthermore, d/Dhh students whose home languages differ from the mainstream language are other contributors to deafness and diversity (Guardino & Cannon, 2015). Lastly, 85% of d/Dhh students attend general education classrooms, and 43% of them spend most of the day there (Hartman et al., 2019).

Causes of Hearing Impairments and Types

Hearing impairment can be congenital or acquired, and many different genetic and environmental factors can lead to hearing loss. For example, some environmental causes include infections during pregnancy and childhood, such as rubella and measles, prematurity, Rh incompatibility, severe jaundice, chronic ear infections, and meningitis (Smith et al., 2015). With respect to location, there are four types of hearing impairment that can be bilateral (affecting both ears) or unilateral (affecting only one ear) (Paul & Whitelaw, 2011; Virginia, 2019).

Four Types of Hearing Impairment:

1. Conductive losses are any malfunctions or abnormalities of the outer or middle ear with the presence of a normal inner ear that can be improved and corrected with amplification and surgery.

2. Sensorineural losses are the most common type of hearing loss that involves damage to the inner ear (cochlea) and/or the auditory nerve. They are not medically correctable, but improvements have been made with hearing aids and/or cochlear implants.
3. Mixed losses involve a combination of conductive and sensorineural components.
4. Central losses occur in the central auditory nervous system which is called an auditory processing disorder (APD). APD exists in the presence of normal hearing, but it causes difficulty in perceiving, discriminating, and understanding sound (Paul & Whitelaw, 2011; Virginia, 2019).

Degrees of Hearing Loss

There are five categories of hearing loss: slight (27-40 dB), mild (41-54 dB), moderate (55- 69 dB), severe (70-89 dB), and profound (>90 dB). Individuals with the first three types of hearing loss have been referred to as hard of hearing, whereas students with the last type of hearing loss are labeled as deaf. Students with severe hearing loss have been labeled either hard of hearing or deaf (Paul & Whitelaw, 2011).

Minimal hearing loss is defined as between 16 and 25 dB (Smith et al., 2015), and research shows that even minimal hearing loss has negative effects on students' achievements (Paul, 2009). Every classroom has background noise. The difference between the teacher's voice and background noise is called the signal-to-noise ratio (SNR). If the teacher's voice is 60 dB and the background noise level is 50 dB, then there is a +10 dB SNR. This rate is important because children with normal hearing require a +6 to +10 dB SNR in the classroom to understand the teacher and other students. On the other hand, children with hearing loss require a +12 to +20 dB SNR. Studies show that classrooms have a -7 to +5 dB SNR (Paul & Whitelaw, 2011). For this reason,

every student's hearing loss should be determined, and special arrangements must be provided. Even slight hearing loss can lead to academic failure, but this group is often not qualified for special education services and is neglected.

Language and Communication Approaches

Hearing impairment causes delays in communication and language development (Bruce & Borders, 2015). Communication is sharing ideas, thoughts, and information, and language is used for communicating either by speaking or signing (CDC, n.d.). Communication is the biggest barrier for d/Dhh individuals and the most important reason for failing in academic and social life. This section provides an overview of the major communication approaches. The first communication option is using speech only, and this approach supports spoken language development.

Oral Philosophy/ Use of Spoken Language

Hearing is one of the most important senses of humans. The five senses are sight, hearing, taste, smell, and touch. Individuals get to know the world with these senses. The lack of one of these senses creates adverse effects. The acquisition of spoken language is linked to hearing, and hearing loss impacts every aspect of spoken language and literacy acquisition, such as vocabulary, grammar, reading, and speech (Thagard, Hilsmier, & Easterbrooks, 2011).

95 % of deaf children are born into hearing families, and parents want their children to talk and understand speechreading (Paul, 2009). Oral approaches focus on using residual hearing and hearing aids or cochlear implants to enhance functional hearing (Gravel & O'Gara, 2003). There are two groups of approaches: auditory -verbal (unisensory) and auditory – oral (multisensory). Both stress the importance of using hearing aids and cochlear implants to use most of the residual hearing to develop spoken language (Virginia, 2019). The auditory-verbal approach focuses

only on audition, while the auditory-oral approach focuses on developing two primary senses, audition and vision, through speech reading, facial expressions, and gestures (Gravel & O’Gara, 2003). There is an equal stress on both senses (Paul, 2009).

Sign Language/ Bilingual-Bicultural Philosophy

ASL is a visual-gestural, rule-governed language that is complete and naturally evolved by the members of the Deaf community. Many members of the Deaf community consider themselves bilingual (use of signing and some form of spoken language) and advocate that deaf children need to be able to communicate in two languages that also allow them to experience two cultures (deaf and hearing) (Gravel & O’Gara, 2003). Bilingual-Bicultural (Bi-Bi) educational philosophies hold the premise of deaf children are inherently members of Deaf culture, and ASL should be their first language, then English should be taught as a second language.

Cued Speech

Cued Speech (CS), also known as Cued Language, is a manual system of cues in combination with spoken language (speech and speechreading) and visual cues (Moore, 2010; Virginia, 2019). CS uses eight different hand shapes and four different locations around the face (Gravel & O’Gara, 2003). Hand shapes represent consonants, and locations around the mouth identify vowels. A hand shape and a location together make a cue that removes the ambiguity of lipreading (Virginia, 2019) since only 40% of speech sounds are visually distinguishable (Gravel & O’Gara, 2003).

Sign Systems (Simultaneous or Total Communication)

A sign system and sign language differ from each other. Sign systems use signs, which are generally borrowed from American Sign Language (ASL), and English word order with some morphological markers while speaking at the same time. On the

other hand, ASL is a natural language that also uses gestures and nonmanual aspects and has a finite set of rules (Paul, 2009).

Sign systems were developed to communicate with deaf children without learning a new language and to give deaf children early access to spoken language. There are five sign communication approaches, ranked from the least to the most representative: English sign, Signed English (SE), seeing essential English (SEE1), signed exact English (SEE2), and Rochester method (RM) (Paul, 2009). English sign is an ASL sign with English word order and has no general rules. Signed English is a system that has 3100 signs and 14 sign makers. Among the SEE systems, SEE 2 is widely used; it incorporates ASL-like signs, and there are 74 invented sign markers. SEE1 has more sign markers. RM conveys English via fingerspelling.

Simultaneous communication (SimCom) is a technique that uses speech and signs at the same time. The usage of sign systems differs among people, and they borrow signs from different systems (Paul, 2009). Total Communication (TC) is the most commonly used communication approach that uses multiple modalities such as sign language, speech, best use of residual hearing through technology, signs, fingerspelling, gestures, body language, facial expression, listening, and speechreading (CDC; Gravel & O’Gara, 2003; Virginia, 2019). Unlike SimCom in this method, all the elements of communication should be used based on the individual needs of a particular child (Moores, 2010).

Fingerspelling

There should be special attention to fingerspelling because all major communication approaches use fingerspelling. The English alphabet has 26 letters, and fingerspelling uses 23 distinct handshapes (three handshapes in two different positions) to represent letters (Paul, 2009). Fingerspelling in RM and ASL differ from each other. RM conveys English via fingerspelling.

It is possible to fingerspell all spoken sentences. Still, there are obvious differences between fingerspelling and English writing because fingerspelling is like a Morse code that uses an enactment of English letters with no direct relation to English phonology (Paul, 2014).

When words are fingerspelled in ASL, they generally refer to names and places. Deaf parents of deaf children's fingerspelling development differ from deaf children who have hearing parents. Skilled fingerspellers perceive and execute words as a movement envelopes. It is common to omit letters during rapid delivery, but unskilled fingerspellers tend to deliver each letter. Deaf children of Deaf parents need to learn fingerspelling twice (Paul, 2015) because, in the beginning stages, children learn words as movement envelops and knowledge of English is not a prerequisite. Then they should learn to associate fingerspelling and letters.

Differentiated Instruction

Even though the hearing loss has adverse effects on learning, d/Dhh students learn in a developmentally similar fashion to hearing students (Paul, 2021). The qualitative similarity hypothesis (QSH) states that the development of certain subject areas such as English language and literacy for d/Dhh children and adolescents is similar to that of typically developing individuals (Paul & Lee, 2010). The QSH argues that there is no need for a separate curriculum for d/Dhh students (Paul, 2021) because the components of the curriculum should be the same. However, the instruction needs to be differentiated, and additional supplements may be necessary (Paul et al., 2013). Thus, the QSH provides a strong rationale for access to the general education curriculum (Paul, 2021).

One of the most important promises of inclusion is access to the general education curriculum and federal policies aim to

improve this access for students with disabilities (Gilmour et al., 2019). To measure access, student achievement is used, and a recent meta-analysis shows that students with disabilities perform more than three years behind their typically developing peers (Gilmour et al., 2019). For this reason, differentiated instruction is especially important for learners like d/Dhh students who may not benefit from traditional strategies (Shepherd & Albert, 2015).

Differentiated instruction is adopting and/or modifying instruction to meet the diverse and individual needs of all students in the same classroom while presenting information in multiple ways. Differentiated instruction also incorporates the principles of the Universal Design for Learning (UDL) (Stanford & Reeves, 2009). Universally designed curriculums offer multiple ways for access, usage, and student engagement and recognize that no single option is effective for all students (Hitchcock et al., 2002). In addition, UDL empowers learners and requires teachers to plan instruction for the success of all students. In UDL classrooms, teachers are responsible for using varied instructional formats and strategies for acquiring knowledge (Stanford & Reeves, 2009).

Individualized education is a key principle of inclusive education for all students, and collaboration supports individual learning in inclusive education (Allman et al., 2019). Collaboration is any interaction between educators. General education teachers and teachers of deaf and hard of hearing students share goals, resources, and decisions to facilitate participation and optimal access to the learning of d/Dhh students in general education (Berndsen & Luckner, 2012). The following lists are adapted from the literature to offer various comprehensive instructional tips and strategies for d/Dhh students (Allman et al., 2019; Erbas, 2017; Berndson & Luckner, 2012; Knoors & Hermans, 2010; Guardino, 2015; Luckner et al., 2016; Esterbrooks & Stephenson, 2006, 2012; Virginia, 2019; Smith et al., 2015; Shields & Lennox, 2017).

Environmental Modifications

- Use preferential seating (at the front of the classroom) to maximum use of residual hearing and speech reading
- For small classrooms, arrange desks in a semicircle.
- Try to reduce background noise so closing doors and windows, and also turn off any unused electrical equipment
- Make sure the classroom is well lit.

Instructional Strategies

- Chose an effective and preferred communication approach based on student's needs
- Provide a note taker and/or interpreter
- Try not to talk when the students can't see your face, such as while writing on the board or walking around the room.
- Speak directly to the student and use a clear, normal tone of voice and speed
- Use facial expressions and hand gestures
- Encourage the student to ask for clarification and always check the comprehension
- Provide extra time for students to complete assignments and examinations
- Give assignments in writing (handout, overhead projector, on the board, via e-mail, or web page).
- Use repair strategies
- Write instructions on the board for visual reference
- Plan short activities and lessons, use brief directions during verbal instruction
- Retain focus by having frequent brain breaks.
- Scaffolding
- Metacognitive strategies
- Use hands-on activities
- Pre and post teaching
- Use one on one instruction
- Use multisensory strategies

Visual and Technological Support

- Use assistive listening devices and amplifiers in the classroom
- Use an FM system
- Make sure the student is using his/her devices
- Use as many visual aids as possible (images, demonstrations, task organizers, graphic organizers, semantic organizers, charts)
- Use videos with real-time captioning, closed captions, or subtitles
- Use technology (smart board, iPads, computer programs, internet sources)

Conclusion

Inclusion becomes a norm for students with disabilities. More d/Dhh students than ever before are educated in general education. Each d/Dhh student has unique educational needs. Therefore, for optimal success in inclusive classes, d/Dhh students should be supported using an appropriate combination approach with a variety of instructional strategies and techniques. Also, collaboration is another key factor for the success of d/Dhh students in an inclusive setting.

STUDENTS WHO ARE BLIND OR VISUALLY IMPAIRED

Students who are blind or visually impaired are a diverse group of students with different characteristics and needs. According to the recent national statistical data (National Center for Education Statistics [NCES], Fall 2016), approximately 90% of students with visual impairments were enrolled in general schools in Fall 2012, and 64% of them received 80% or more of their daily instruction in general education classrooms. Inclusion begins in regular education settings, and students' academic performances are not the concern of inclusion but are only concerned about students' benefits of being in the general education class (Huston, 2007).

Inclusion has numerous advantages and there is a mutual benefit for both typically developing and disabled students such as:

- Increased social interaction between students with and without disabilities
- Typical children are raising awareness of differences, become more supportive and helpful and learn to give value to the relationship with students with disabilities
- Accessing the general curriculum
- Support in academic and social environments
- Higher expectations
- Preparation for adult life (MEB, 2014; Smith et al., 2015).

Definitions and Classifications of Students with Visual Impairments

According to IDEA (2004), “visual impairment including blindness means an impairment in vision that, even with correction, adversely affects a child’s educational performance. The term includes both partial sight and blindness” (34 CFR 300.8(c)(13)). Students with visual impairments are a heterogeneous group that represents a group of students that ranges from those with low vision to those who are blind, and they can be classified based on different characteristics such as congenital and adventitious visual impairments (Welsh & Tuttle, 1997). Congenital visual impairment means a visual impairment is present at birth whereas adventitious visual impairment is a subsequent loss in the later of life (Welsh & Tuttle, 1997).

There are different classifications for students with visual impairments. Perfect vision is 20/20 visual acuity, and the term legally blind is used for people with 20/200 visual acuity or less in the better eye. That means there could be some useful vision even if the person is legally blind. Totally blind is defined as people who do not have any useful vision, and low vision is defined as

20/70 visual acuity in the better eye (Wiener, Welsh, & Blasch, 2010). Students who are blind use braille or auditory methods to receive instructions in school whereas vision is the primary sensory channel for students with low vision (Smith et al., 2015).

Demographics of Students with Visual Impairments

Visual impairment is a low-incidence disability that accounts for less than 1% of the school population. Albinism, amblyopia, cataracts, diabetic retinopathy, glaucoma, hereditary, physical trauma, prematurity, refractive errors, retinal degeneration, retinitis pigmentosa, and rubella are some of the causes of visual impairments.

Many students with visual impairments can read print. According to the American Printing House for the Blind (2018), approximately 33% of students with visual impairments are visual readers, 8% are braille readers, and 12% are auditory readers. The rest of the students with visual impairments are pre-readers or non-readers. Approximately 63% of students with visual impairments are visual readers, 15% are braille readers, and 22% are auditory readers by reading medium if we exclude pre-readers and non-readers. Visual readers use large print and magnification devices to read.

One of the most significant components of the IDEA was the Least restrictive environment, which is described as the environment that allows students with disabilities to be educated with their non-disabled peers as much as possible. This includes general education classrooms but can also include specialized schools or hospitals if the IEP team deems this setting is the most appropriate for the individual students (Smith et al., 2015).

Inclusion practices have been spreading for students with visual impairments. Approximately half of the children who are classified as legally blind in the United States lived in residential schools for the blind in 1963 (Smith et al., 2015). American Printing

House for the Blind (2018) reported that 83% (51271) of children with visual impairments attend public schools, and 8.4% (5196) of children with visual impairments attended specialized schools for students with visual impairments. According to the American Printing House for the Blind (2018), 84.3% (53551) of children with visual impairments attended public schools, and 7.9% (4994) of children with visual impairments attended specialized schools for students with visual impairments. Those statistics show that the number and percentage of students with visual impairments in public schools have still increased from 2015 to 2018.

Mainstreaming and inclusion are sometimes used interchangeably, but they are different concepts. According to Dev (1996), mainstreaming is a partial integration of students with disabilities into general education settings, based on their individual needs, abilities, and characteristics. On the other hand, inclusion begins in general education settings, and students' academic performances are not the concern of inclusion but are only concerned with students' benefits of being in the general education class. In addition, full inclusion means that students with disabilities will be in a general education classroom full-time regardless of their disabilities' condition and severity.

Assistive Technologies

Assistive technology has positive impacts on people with vision loss can be anything such as Braille notetakers, refreshable Braille notetakers, computers, smartphones, talking books, CCTVs, large print, screen readers, tactile maps, and DAISY format (Kelly & Smith, 2011).

In the assistive technologies for students who are visually impaired, screen readers and audiobooks are most used. In 2014, 9.2% of legally blind students were auditory readers. These books have advantages and disadvantages. The main disadvantage is that students cannot freely choose any page.

Tactile maps are another assistive technology that helps students with vision loss, especially in math and science classes. Rosenblum and Herzberg (2015) study what qualities comprise an excellent tactile graphic in mathematics and science classes. Visual impairments usually have lower achievement in science and mathematics than their sighted peers. Tactile graphics supply readers with critical information included in charts, graphs, diagrams, or maps. Visually impaired students' opinions are examined about tactile graphics in this research. Twelve youths who read braille shared their practices with tactile graphics in science and mathematics classes. The students usually reported difficulty locating particular information on the y-axis even though there were gridlines. Most youths expressed they preferred graphics that had clear divisions among elements. Youths were eagerly aware of the certainty of their abilities. Students with visual impairments can need extra time and direct instruction to acquire skills related to measurement and interpreting bar charts and line graphs. If three-dimensional printers can be used in the graphics, the visually impaired students can easily understand them.

According to Kelly and Smith (2011), assistive technologies have been developing rapidly, and they have significant positive impacts on people who are blind or visually impaired. Another useful assistive technology different than listed earlier is Video Magnifiers or Closed Circuit Television Systems (CCTVs). CCTVs are devices that enlarge written or printed texts. These devices are generally for individuals with low vision.

Differentiated Instruction

Students with visual impairments can successfully receive education in general education classrooms with appropriate accommodations.

Classroom accommodations:

- Use preferential seating (at the front of the classroom) to take advantage of any vision the child can use
- Create extra space for students with visual impairments to use and store equipment
- Ensure students with visual impairments have proper lighting
- Orient the students to the classroom and building to help students with visual impairments to understand the physical layout of the building and classroom.

Instructional Considerations:

- Use concrete materials
- Use verbal cues
- Use high-contrast colors on papers and boards
- Share notes with students with visual impairments
- Develop a peer support system
- Engage in various activities
- Use more auditory and tactile materials
- Use more hands-on activities
- Provide large print and braille materials based on students' needs
- Allow extra time for students with visual impairments in-class assignments and tests

Social-Emotional Considerations:

- Teach other students about visual impairments
- Create situations for students with visual impairments to socialize with other students
- Reinforce students for their efforts
- Meet regularly with parents of the students
- Meet regularly with Teacher of Students with Visual Impairments (TVI)

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