Module 2: The Sensory System, The Brain, and Learning
MODULE 2 – THE SENSORY SYSTEM, THE BRAIN, AND THEIR ROLE IN LEARNING

TEAM LEAD:

Kathee Scoggin
Project Co-Director, Washington State Services for Children with Deaf-Blindness

TEAM CONTRIBUTORS:

Kimberly Lauger
Parent Leader, AZ
Intervener Trainer for Arizona Deafblind Project

Melanie Knapp
Parent Leader, TX

Holly Cooper, Ph.D.
Deaf-Blind Educational Consultant, Texas DeafBlind Project

Karen Christianson
Communication Specialist, Arizona State School for the Deaf and the Blind

Deanna Peterson
Teacher, Texas School for the Blind and Visually Impaired
OPEN HANDS, OPEN ACCESS: DEAF-BLIND INTERVENER LEARNING MODULES

MODULE 2: THE SENSORY SYSTEM, THE BRAIN, AND LEARNING

LEARNING OUTCOMES
- Understand the importance of each of the seven senses.
- Understand the brain-senses connection and its impact on learning.
- Understand some general strategies for supporting a student’s learning.
- Understand basic information about all seven senses.
- Know how to identify additional resources to learn more.

Intervener Journal Module 2 (Appendix 1)
Module 2 Tipsheet (Appendix 2)
CEC & Professional Standards Document (Appendix 3)

INTRODUCTION (10 MINUTES)

Let’s get started!

First, to gain an understanding of the importance of the senses for children who are deaf-blind, watch this slide presentation, “The Sensory System: Experiencing the World.”

INQUIRY CHALLENGE (30 MINUTES)

Let’s step out of our everyday world for a moment and think about what is it like to have limited vision and hearing?

**Step 1:** Open the document called “Vision Simulation Instructions” and do the simulation exercise. (Appendix 4)
**Step 2:** After you have finished, complete the questions for this activity that are listed in the Intervener Journal for Module 2.

LEARNING ACTIVITY 1: THE BOX OF DEAF-BLINDNESS (15 MINUTES)
This activity involves watching the following 10-minute video. It introduces you to the *Box of Deaf-Blindness*, a model designed to help people understand how to facilitate learning in students who are deaf-blind by providing ways for them to engage with the world through the sensory channels they have available. The concept of the *Box of Deaf-Blindness*, and this video, were created by Kimberly Lauger. Kimberly is the mother of a child with CHARGE Syndrome and a trainer for the Arizona Deaf-Blind Project.

Video – Box of Deafblindness
http://www.youtube.com/watch?feature=player_embedded&v=LTUqmCjb4s4

Once you have finished watching the video, move on to the next activity, but keep the idea of the box in mind as you work through the module. If you work with a student who is deaf-blind, think about how it applies to your student. At the end of the module, you will watch the video again and then complete an assignment based on your student or a case study student.

**Takeaway:**

The information that comes through our sensory channels has a profound impact on how we organize information, how we function in everyday routines, and how we experience the world.

**Learning Activity 2: The Brain-Senses Connection (60 Minutes)**

**Step 1:** Watch the slide presentation, *Making Sense of it All: The Brain-Senses Connection*.

**Step 2:** Read the article “How the Nervous System Works.” (Appendix 5)

**Step 3:** Complete the Brain-Senses Connection Quiz, which is based on the slide presentation and the reading.

**Step 4:** Reflect on how what you learned during this activity will affect your interactions with students who are deaf-blind.

**Takeaway:**

The brain is not separate from any of our sensory experiences. Interveners and educators need to understand basic information about the brain to support students with deaf-blindness.

**Learning Activity 3: The Seven Senses (3 Hours)**
Step 1: Watch the slide presentation "The Seven Senses: Introduction."

Step 2: Watch the slide presentation The Seven Senses Part 1: Vision

Step 3: Watch the slide presentation The Seven Senses Part 2: Hearing

Step 4: Watch the slide presentation The Seven Senses Part 3: Touch

Step 5: Watch the slide presentation The Seven Senses Part 4: Smell & Taste

Step 6: Watch the slide presentation The Seven Senses Part 5: Proprioceptive & Vestibular Senses

Takeaway:

All 7 senses are gateways to the world around us. Each sense plays a different role and functions with the other senses to help us organize and respond to information in the environment. Often the senses of touch, taste, smell, proprioception, and vestibular are overlooked as channels for teaching and learning.

LEARNING ACTIVITY 4: APPLY WHAT YOU’VE LEARNED (2 HOURS)

You have covered a great deal of material in this module. Now it is time to synthesize what you have learned and apply it to what you know about your own student. If you don't have a student, you will use a case-study student (see folder below called "Dylan Information Documents").

Step 1: Review the etiology form you completed for your student in Module 1
Step 2: Open and review the document “Box of Deafblindness Assignment” (Appendix 6).
Step 3: Watch the Box of Deafblindness video again.
Step 4: Assignment: Complete the Box of Deafblindness assignment (Appendix 6) and post it to the Box of Deafblindness Discussion Board.
Step 5: Assignment: Complete the “Learn About Additional Resources” Assignment and submit it using the link below. (Appendix 7)

Takeaway:

This activity allows you to apply the framework of the Box of Deafblindness to a specific student. It gives you the chance to see how organizing and connecting this information can help you better understand student needs.
REVISITING THE INQUIRY CHALLENGE (30 MINUTES)

At the beginning of this module, you did a short simulation and, in your intervener journal, responded to some questions about that experience. Now, open up the journal again and read your earlier responses.

With your own experiences and all you have learned in this module in mind, respond to the next set of questions in the journal under "Revisiting the Inquiry Challenge Questions." These are designed to help you reflect on the impact of sensory losses on information gathering.

DOCUMENTED ACCOMPLISHMENTS

1. Inquiry Challenge Pre and Post Journal Reflections
2. Vision Simulation
3. Brain-Senses Connection Quiz
4. Box of Deafblindness Assignment and Discussion Board Activity
5. "Learn About Additional Resources" Assignment

SELF-EVALUATION

Module Takeaway:

By the very definition of deaf-blindness, you understand that all students who are deaf-blind experience different levels of access to both visual and auditory information. Beyond the senses of vision and hearing, some children who are deaf-blind are born with conditions that also affect their access to sensory input. For example, students with CHARGE may have greatly reduced senses of smell or taste.

You have learned some basic information about all 7 senses and how the brain is a part of that sensory processing system for all people. For students who are deaf-blind, an intervener or any team member should collaborate with other medical and educational professionals to understand more about what types of sensory information a student has access to as well as what environmental conditions support that student's access to information around them.

Please download and complete the self-evaluation link. (Appendix 8)

REFERENCES

Module 2 References (Appendix 9)

ADDITIONAL RESOURCES
In this section, you will find some additional great resources about the senses.
Module 2 Additional Resources List (Appendix 10)

If you need additional information about deaf-blindness contact the NCDB Library
Web: nationaldb.org/library
Phone: 800-438-9376
TTY: 800-854-7013
Email: info@nationaldb.org
Intervener Journal Module 2

This journal is a way for you to note ideas or thoughts that you have as you proceed through the module. It also includes some questions that you will be directed to from specific sections of the module.

Before you use this journal, save a copy to your computer or other location outside of Moodle.

Inquiry Challenge Questions - Simulation

Reflect on your experience of the simulation of vision and hearing loss.

1. How did you feel during the simulation (not what did you think)?
2. What did you notice while sitting in the chair?
3. What senses did you use during this time?
4. How long did 10 minutes seem to you?
5. Do you think a student with deaf-blindness ever has to sit for 10 minutes with little or no sensory input?
6. Did you notice anything you did to pass the time while you were waiting?

Revisiting the Inquiry Challenge Questions

For the senses listed below:
- name two ways that each helps you gather information as a person who is not deaf-blind and
- identify one way in which damage to each sense could impact a person’s ability to gather information.

Seeing
1.
2.
Impact of damage to vision:
Hearing
1.
2.
Impact of damage to hearing:

Touch
1.
2.
Impact of damage to sense of touch:

Taste
1.
2.
Impact of damage to sense of taste:

Smell
1.
2.
Impact of damage to sense of smell:

Vestibular
1.
2.
Impact of damage to vestibular system:

Proprioception
1.
2.
Impact of damage to proprioception:
Activities within this Module

I. Introduction – Experiencing the Sensory World 10 Minutes
II. Inquiry Challenge – Vision Simulation 30 Minutes
III. Learning Activity 1 – The Box of Deaf-Blindness 15 Minutes
IV. Learning Activity 2 – The Brain-Senses Connection 60 Minutes
V. Learning Activity 3 – The Seven Senses 3 Hours
VI. Learning Activity 4 – Apply What You’ve Learned 2 Hours
VII. Revisiting the Inquiry Challenge 30 Minutes

Under the “Learning Outcomes,” you will find an Intervener Journal that you can use to take notes as you go through the modules. (You will also need it for some assigned activities.)

<table>
<thead>
<tr>
<th>Finished Activity</th>
<th>Takeaways</th>
<th>Got it!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inquiry Challenge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning Activity 1</td>
<td>The information we take in from our senses has a profound impact on how we experience the world.</td>
<td></td>
</tr>
<tr>
<td>Learning Activity 2</td>
<td>An understanding of the brain-senses connection is important for interveners and educators.</td>
<td></td>
</tr>
<tr>
<td>Learning Activity 3</td>
<td>Each of the 7 senses plays a different role, but they work together to help us function in the world.</td>
<td></td>
</tr>
<tr>
<td>Learning Activity 4</td>
<td>The &quot;Box of Deafblindness&quot; framework can help you better understand a student's needs.</td>
<td></td>
</tr>
</tbody>
</table>

If you need more information about deaf-blindness, visit nationaldb.org
<table>
<thead>
<tr>
<th>Standards</th>
<th>Knowledge Statement</th>
<th>Skills Statement</th>
<th>Where Addressed in the Module Content</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard 1: Foundations</strong></td>
<td></td>
<td>None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DBI1K2 Differences between congenital and acquired deaf-blindness</td>
<td></td>
<td>DBI1K2 - Inquiry challenge Box of Deafblindness presentation</td>
</tr>
<tr>
<td></td>
<td>DBI1K3 Implications of the age of onset of vision and hearing loss, the types and degrees of loss, and the presence of additional disabilities on development and learning</td>
<td></td>
<td>DBI1K3 - Inquiry challenge Box of Deafblindness presentation</td>
</tr>
<tr>
<td></td>
<td>DBI1K4 Anatomy and function of the eyes and ears</td>
<td></td>
<td>DBI1K4 - Sensory system presentation; Intervener journal document, Inquiry challenge Box of Deafblindness presentation; Learning activity 2 etiology video; Learning Activity 3 hearing slides 1–3; vision slides 4–25</td>
</tr>
<tr>
<td><strong>Standard 2: Development and Characteristics of Learners</strong></td>
<td></td>
<td>None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DBI2K1 Impact of combined vision and hearing loss on development and learning</td>
<td></td>
<td>DBI2K1 - 7 Senses presentation</td>
</tr>
<tr>
<td></td>
<td>DBI2K4 Impact of deafblindness on bonding, attachment, and social interaction</td>
<td></td>
<td>DBI2K4 - Inquiry challenge Box of Deafblindness presentation</td>
</tr>
<tr>
<td></td>
<td>DBI2K6 Impact of deafblindness related to isolation, stress, and vulnerability</td>
<td></td>
<td>DBI2K6 - Introductory simulation; Inquiry challenge Box of Deafblindness presentation</td>
</tr>
<tr>
<td></td>
<td>DBI2K8 Impact of additional disabilities on deafblindness</td>
<td></td>
<td>DBI2K8 Activity 3- video on the brain; 7 Senses slides</td>
</tr>
<tr>
<td></td>
<td>DBI2K9 Brain development and the neurological implications of combined vision and hearing loss</td>
<td></td>
<td>DBI2K9 - Inquiry challenge Box of Deafblindness presentation, Learning Activity 1 full presentation;</td>
</tr>
<tr>
<td>Module Development Crosswalk to CEC Standards</td>
<td>Initial Coding of Competencies – July, 2013 (Based on One Cycle of Field Testing and Alignment)</td>
<td>Lessons learned from Neurobiology article; Brain-Senses Connection Quiz, Activity 3 video on the brain and sense of smell slides 4–5</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
</tbody>
</table>
| **Standard 3: Individual Learning Differences** | **DBI3K1** Specific causes of deaf-blindness  
**DBI3K5** Audiological and ophthalmological conditions and functioning of the individual  
**DBI3K6** Additional disabilities of the individual, if present  
**DBI3K7** Effects of additional disabilities on individual, if present | None |
| **DBI3K1** - Learning activity 2  
**DBI3K5** - Learning Activity 3 hearing slides 1–3 and vision slides 4–25  
**DBI3K6** - Inquiry challenge; Activity 3 video of Kathryn |
| **Standard 4: Instructional Strategies** | **DBI6K2** Impact of deafblindness on communication and interaction | **DBI6K2** - Hearing Sense google presentation |
| **Standard 5: Learning Environments/Social Interactions** | | |
| **Standard 6: Language** | | |
| **Standard 7: Instructional Planning** | | |
| **Standard 8: Assessment** | | |
| **Standard 9: Professional and Ethical Practice** | **SEP10K1** Common Concerns of families of individuals with exceptional learning needs | **SEP10K1** - multiple video interviews with parents of children who are deaf-blind |
| **Standard 10: Collaboration** | | |
Module 2: The Sensory System, the Brain, and Learning

Vision Loss Simulation Instructions

In this exercise, vision loss is simulated with a blindfold. Hearing loss is not simulated, but we ask you to do the simulation in a quiet environment.

Please note: The purpose of this simulation is not to create an experience of what it is like to be deaf-blind. As a sighted person you have visual memories to draw on that are connected with concepts, vocabulary, and language. A student born with low vision or blindness does not have the visual sensory information that you have gleaned throughout your life.

Equipment needed: a blindfold that will keep the light out.

Amount of time required: 30 minutes total (including the time it takes to respond to questions listed in your intervener journal).

Process:
1. Find a quiet location.
2. Sit in a chair that is like one you might find in a school (not a couch or recliner).
3. Set a timer for 10 minutes.
4. Blindfold yourself and wait for the timer to go off.
5. For 10 minutes, sit in the chair. Don’t talk or listen to others talk. Don’t listen to music. Don’t get up or fidget with tasks or objects. Just sit.

When you are finished, open your intervener journal and respond to the questions listed under the heading “Inquiry Challenge Questions – Simulation.”
How the Nervous System Works

The basic functioning of the nervous system depends a lot on tiny cells called neurons. The brain has billions of them, and they have many specialized jobs. For example, sensory neurons take information from the eyes, ears, nose, tongue, and skin to the brain. Motor neurons carry messages away from the brain and back to the rest of the body.

All neurons, however, relay information to each other through a complex electrochemical process, making connections that affect the way we think, learn, move, and behave.

Intelligence, learning, and memory. At birth, the nervous system contains all the neurons you will ever have, but many of them are not connected to each other. As you grow and learn, messages travel from one neuron to another over and over, creating connections, or pathways, in the brain. It's why driving seemed to take so much concentration when you first learned but now is second nature: The pathway became established.

In young children, the brain is highly adaptable; in fact, when one part of a young child's brain is injured, another part can often learn to take over some of the lost function. But as we age, the brain has to work harder to make new neural pathways, making it more difficult to master new tasks or change established behavior patterns. That's why many scientists believe it's important to keep challenging your brain to learn new things and make new connections—it helps keeps the brain active over the course of a lifetime.

Memory is another complex function of the brain. The things we've done, learned, and seen are first processed in the cortex, and then, if we sense that this information is important enough to remember permanently, it's passed inward to other regions of the brain (such as the hippocampus and amygdala) for long-term storage and retrieval. As these messages travel through the brain, they too create pathways that serve as the basis of our memory.

Movement. Different parts of the cerebrum are responsible for moving different body parts. The left side of the brain controls the movements of the right side
of the body, and the right side of the brain controls the movements of the left side of the body. When you press the accelerator with your right foot, for example, it's the left side of your brain that sends the message allowing you to do it.

**Basic body functions.** A part of the peripheral nervous system called the autonomic nervous system is responsible for controlling many of the body processes we almost never need to think about, like breathing, digestion, sweating, and shivering. The autonomic nervous system has two parts: the sympathetic and the parasympathetic nervous systems.

The sympathetic nervous system prepares the body for sudden stress, like if you see a robbery taking place. When something frightening happens, the sympathetic nervous system makes the heart beat faster so that it sends blood more quickly to the different body parts that might need it. It also causes the adrenal glands at the top of the kidneys to release adrenaline, a hormone that helps give extra power to the muscles for a quick getaway. This process is known as the body's "fight or flight" response.

The parasympathetic nervous system does the exact opposite: It prepares the body for rest. It also helps the digestive tract move along so our bodies can efficiently take in nutrients from the food we eat.

**The senses.** Your spouse may be a sight for sore eyes at the end of a long day — but without the brain, you wouldn't even recognize him or her. Pepperoni pizza sure is delicious — but without the brain, your taste buds wouldn't be able to tell if you were eating pizza or the box it came in. None of your senses would be useful without the processing that occurs in the brain.

- **Sight.** Sight probably tells us more about the world than any other sense. Light entering the eye forms an upside-down image on the retina. The retina transforms the light into nerve signals for the brain. The brain then turns the image right-side up and tells us what we are seeing.
- **Hearing.** Every sound we hear is the result of sound waves entering our ears and causing our eardrums to vibrate. These vibrations are then transferred along the tiny bones of the middle ear and converted into nerve signals. The cortex then processes these signals, telling us what we are hearing.
- **Taste.** The tongue contains small groups of sensory cells called taste buds that react to chemicals in foods. Taste buds react to sweet, sour, salty, and bitter. Messages are sent from the taste buds to the areas in the cortex responsible for processing taste.
- **Smell.** Olfactory cells in the mucous membranes lining each nostril react to chemicals we breathe in and send messages along specific nerves to the brain— which, according to experts, can distinguish between more
than 10,000 different smells. With that kind of sensitivity, it's no wonder research suggests that smells are very closely linked to our memories.

- **Touch.** The skin contains more than 4 million sensory receptors — mostly concentrated in the fingers, tongue, and lips — that gather information related to touch, pressure, temperature, and pain and send it to the brain for processing and reaction.

Reviewed by: Yamini Durani, MD
Date reviewed: October 2012
Module 2: The Sensory System, the Brain, and Learning

Box of Deafblindness Assignment

1. Review what you know about your student’s senses: hearing, vision, touch, smell, taste, vestibular, and proprioception.
   a. You might want to talk to other team members or review assessment reports or other records if they are available.
   b. You should also use your completed “Learn About Your Student’s Etiology” assignment that you completed in Module 1.
   c. If you are not currently working with a student, use the records for the example student (see the folder called “Example Student Documents”).

2. Identify the senses that the student has available for learning and write them in upper right hand side of the diagram on the next page.

3. Now think about these senses in more detail and make notes about what you know about them below the diagram. Answer these questions:
   a. Are some of the senses only partially available? Which are they?
   b. For senses that are partially available, in what ways are they available (e.g., at what distances, for which types of activities, and under what circumstances)? Does the student require support from assistive devices or technology to use those senses? If so, what type?

4. Post your completed form to the Box of Deafblindness Discussion Board. Read at least one other person’s completed assignment and provide a supportive reflection of their work.
The Box of Deafblindness™
A Visual Framework for Facilitating Engaged Learning

Kimberly Lauger 2012
Learn About Additional Resources Assignment

There is so much to know about the seven senses. In this assignment you will explore other resources that provide information to help you learn more about how to work effectively with your student.

**Part A**
1. Identify characteristics of your student that you would like to better understand in *each* of the following areas:
   a. Vision (e.g., type of vision loss, strategies to help your student use his or her vision)
   b. Hearing (e.g., type of hearing loss, type of hearing device)

2. Go to the document “Additional Resources List” at the end of the module and choose one resource in each category (hearing and vision) that you think will relate to your student. Read or view your chosen resources and write a short paragraph on each about how this is relevant for your student. Post on the discussion board.

**Part B**
1. Identify *one* of the following areas that you would like to learn more about in order to help your student:
   a. Touch
   b. Taste/Smell
   c. Vestibular/Proprioceptive

2. Select and read (or view) one resource from the “Additional Resources List” on your chosen topic. Identify one thing that you learned that you didn’t already know and write a short paragraph about how this knowledge might help you when working with your student.

**Part C**
Just for your own information, save the list of Additional Resources for future reference.
Use the following self-checks to reflect on your own progress with a module instructor or as a part of your own self-study.

### Module 2: Intervener Journal Entries
The module participant engages in the simulation activity and views the introductory slide presentation. The participant uses the Intervener Journal Entry Module 2 as a part of the journal assignment (see downloadable word file).

<table>
<thead>
<tr>
<th>Module Participant: __________________________</th>
<th>Overall: <strong>T, GT, NR</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td>Thoughtful</td>
</tr>
<tr>
<td>Answers all questions related to the inquiry challenge video both before and after taking module</td>
<td>Answered all the questions. Answers show thoughtful responses.</td>
</tr>
<tr>
<td>Cites or notes specific resources in the module readings or videos</td>
<td>Showed knowledge gained by citing materials and resources in module.</td>
</tr>
</tbody>
</table>

### Module 2 True-False Quiz About the Brain Senses Connection

<table>
<thead>
<tr>
<th>Module Participant: __________________________</th>
<th>Quiz: __ / <em><strong>10</strong></em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td>Thoughtful</td>
</tr>
<tr>
<td>Brain Quiz using Notes</td>
<td>9 to 10 correct answers</td>
</tr>
</tbody>
</table>

### Module 2 Etiology Quiz

<table>
<thead>
<tr>
<th>Module Participant: __________________________</th>
<th>Quiz: __ / <em><strong>10</strong></em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td>Thoughtful</td>
</tr>
<tr>
<td>Multiple Choice</td>
<td>9 to 10 correct</td>
</tr>
<tr>
<td>Quiz Using Module Notes</td>
<td>answers</td>
</tr>
<tr>
<td>-------------------------</td>
<td>---------</td>
</tr>
</tbody>
</table>

**Module 2  “Box of Deafblindness” and Etiology Student Form- Discussion**

**Module Participant:** ____________________________  **Overall:** _T, GT, NR___

<table>
<thead>
<tr>
<th>Content</th>
<th>Thoughtful</th>
<th>Getting There</th>
<th>Needs Review</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>The participant responds to the prompt questions and reflects knowledge readings and viewing in the “Box of Deafblindness”</td>
<td>Completes all areas of the “Box of Deafblindness” on a student participant knows or on case study student</td>
<td>Completes most areas of “Box of Deafblindness” form</td>
<td>Responds to less than requested than half of the prompts</td>
<td></td>
</tr>
<tr>
<td>The participant responds to all of the questions on the etiology form</td>
<td>Completes all areas of the Etiology Student form on a student the participant knows or on the case study student</td>
<td>Completes most areas of the Etiology Student form</td>
<td>Responds to less than half of the prompts</td>
<td></td>
</tr>
<tr>
<td>The participant reflects upon at least one other participants’ posts thoughtfully.</td>
<td>Comments upon at least one other participants’ posts thoughtfully</td>
<td>Posts comments on one other participant’s posts incompletely- only on one of the requested forms</td>
<td>Does not post on others’ responses</td>
<td></td>
</tr>
</tbody>
</table>

**Module 2  Learn About Additional Resources Assignment**

**Module Participant:** ____________________________  **Overall:** _T, GT, NR___

<table>
<thead>
<tr>
<th>Content</th>
<th>Thoughtful</th>
<th>Getting There</th>
<th>Needs Review</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>The participant responds to the prompt questions and reflects knowledge from resource list</td>
<td>Completes all areas areas of form and reflects knowledge</td>
<td>Completes most areas of form and reflects knowledge</td>
<td>Responds to less than requested than half of the prompts</td>
<td></td>
</tr>
</tbody>
</table>

_OHOOA July 2013_
Module 2: The Sensory System, the Brain, and Learning

References

Learning Activity 2: The Brain-Senses Connection

[Slide Presentation] Making Sense of it All: The Brain-Senses Connection

Required Reading

Learning Activity 3: The Seven Senses

[Slide Presentation] The Seven Senses Part 1: Vision

OHOA July 2013
[http://www.cde.state.co.us/cdesped/download/pdf/dbColobomaEye.pdf](http://www.cde.state.co.us/cdesped/download/pdf/dbColobomaEye.pdf)


[Slide Presentation] The Seven Senses Part 2: Hearing


[Slide Presentation] The Seven Senses Part 4: Smell & Taste


[Slide Presentation] The Seven Senses Part 5: Proprioceptive & Vestibular Senses


Module 2: The Sensory System, the Brain, and Learning

Additional Resources

Tips:
1. Use this resource list for the “Learn About Additional Resources Assignment.”
2. Print (or download) and save a copy for your future reference needs.
3. Remember, you can always go to the NCDB Library (nationaldb.org/library) or contact NCDB directly (800-438-9376; info@nationaldb.org) if you need more information.

This document contains the following sections:
- Vision – p. 2
  - General Information About Vision
  - Cortical Visual Impairment
- Hearing – p. 4
- Touch – p. 5
- Taste & Smell – p. 7
- Proprioceptive & Vestibular Senses – p. 8
- Sensory Integration – p. 9

Most of the items listed are available either as links to external web pages OR they are in the documents folder under “ADDITIONAL RESOURCES” at the end of the module.

There are a few, however, that you need to own or borrow to use. If you are interested in one of these but do not have access to them, contact NCDB for assistance.

Vision

General Information About Vision

An extensive list of eye conditions that includes an explanation of each condition and suggested resources to get more information.
Arizona Center for the Blind and Visually Impaired. (no date). *Vision loss simulation presentation.* [Slides]  
http://www.acbvi.org/albums/Vision/slide1.html  
This presentation contains slides of simulations of various types of vision loss.

Blind Babies Foundation. (no date). *How the brain and the eye work together.* [Fact Sheet]  
Explains how information is transmitted from the eye to the brain, describes the difference between near-sightedness (myopia) and far sightedness (hyperopia), and provides an illustration and brief explanation of the parts of the eye and their functions.

http://www.freedomscientific.com/about/vision-terms.asp  
Another excellent glossary. It includes visual devices as well as eye conditions.

*Human sensory organs – Eyes*  
This video provides an introduction to the structure and of the eye (length: 13 minutes).  
http://www.youtube.com/watch?v=3YWnrqwDBD8

NCDB. *Primary classification of vision impairment in children and youth who are deaf-blind (2007 and 2010).* [Documents Folder]  
Data from NCDB national child count data.

**Cortical Visual Impairment (CVI)**

*We have included a number of resources specifically on cortical visual impairment (CVI) because it is the leading cause of bilateral visual impairment in children in developed countries.*

Blind Babies Foundation. (no date). *Cortical visual impairment.* [Fact Sheet]  
Describes how CVI differs from other visual impairments and explains characteristics, myths, and teaching strategies.

*Cortical visual impairment: guiding principles* [Documents Folder]  
A one-page summary of key concepts from the book *Cortical Visual Impairment: An Approach to Assessment and Intervention* by Christine Roman-Lantzy.
http://support.perkins.org/site/PageServer?pagename=Webcasts_Cortical_Vision_Impairment
A clip of this video presentation was included in the slide presentation on vision in Learning Activity 3. This link is to the full video.

A one page explanation about cortical visual impairment.

TSBVI. (Updated 2012). *Introduction to cortical/cerebral visual impairment (CVI)*.
http://www.tsbvi.edu/cvi-intro
This web page has information and links to a wide array of resources. Just pick one or two sections or a video of interest to you for your assignment.

## Hearing

*Auditory considerations in the learning environment* [Documents Folder]
A worksheet organized and adapted by Kathee Scoggin. Based on information by Noel Matkin, University of Arizona, 1980.

http://www.betterhearing.org/hearing_loss/hearing_loss_simulator/index.cfm
Audio of normal, mild, and moderate hearing loss in a variety of situations and with background noise.

http://www.tsbvi.edu/seehear/winter05/winter05.pdf
This article is about hearing aids and cochlear implants and how they work.

*Ear tumors* (see page 8 of this newsletter). (Early Fall 2012). Nevada Dual Sensory Impairment Project Newsletter, 21(1).

Matkin, Noel D. (no date). *Guidelines for classroom management of children*. Children's Hearing Clinic, University of Arizona. [Documents Folder]

*Promoting wearing of hearing aids* (see pages 4 & 5 of this newsletter). (Early Fall 2012.) Nevada Dual Sensory Impairment Project Newsletter, 21(1).
NCDB. *Primary classification of hearing impairment in children and youth who are deaf-blind (2007 and 2010).* [Documents Folder]
Data from NCDB national child count data.

U.S. Food and Drug Administration. (Updated 2010). *What is a cochlear implant?*
http://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/ImplantsandProsthetics/CochlearImplants/ucm062823.htm
Simple information about cochlear implants—what they do and how they work.

This article provides an overview of cochlear implants. It emphasizes the importance of improving spatial and environmental awareness and describes how the ability to localize allows for improved security, safety and independence. [Note: This item is not available on the web or in the resource folder. If you need help locating a copy, contact NCDB’s DB-LINK Information Services at 800-438-9376 or info@nationaldb.org.]

**Touch**

http://www.sciencedaily.com/releases/2010/10/101026172021.htm
Interesting article that explains how blind people can perceive touch faster than those with sight.

This is a book. Chapter 4 focuses on a variety of tactile strategies including: 1) tactile modeling, 2) hand-under-hand contact, and 3) mutual tactile attention. [Note: This item is not available on the web or in the resource folder. If you need help locating a copy, contact NCDB’s DB-LINK Information Services at 800-438-9376 or info@nationaldb.org.]

This article covers tactile learning and teaching including things to consider, the need for allowing extra time for learning through touch, providing effective tactile representation, and making adaptations.

This provides a simple yet comprehensive overview of the sense of touch. It includes some excellent learning activities, to better understand touch.

This is a book. Chapter 10 focuses on the role of the adult partner who is central in supporting a child’s learning. It addresses 1) sensory function, 2) role of near and distance senses, 3) interpreting sensory experiences, and 4) mediating learning experiences. [Note: This item is not available on the web or in the resource folder. If you need help locating a copy, contact NCDB’s DB-LINK Information Services at 800-438-9376 or info@nationaldb.org.]

Moss, Kate. Some things to learn from learning through touch. *SEE/HEAR Newsletter, Spring 2005.*
http://www.tsbvi.edu/seehear/spring05/things.htm
This is a simple yet comprehensive overview of the sense of touch. It has excellent suggestions about how to get children to use their hands and learn more from touch.

*Neuroscience for kids presents: Your really weird body map.*
http://faculty.washington.edu/chudler/flash/hom.html
Simple yet very powerful illustration of touch receptors in the body. Why does this matter? Think about yourself in relation to this concept and your own perceptions of touch.

*Project SALUTE. (no date). Mutual tactile attention.*
http://www.projectsalute.net/Learned/Learnedhtml/MutualTactile.html
Explains the meaning of mutual tactile attention and how to do it. Includes considerations, advantages, disadvantages, strategies, and a bibliography.

*Project SALUTE. (no date). Selected resources.*
http://www.projectsalute.net/Resources/Resourceshtml/Resourcemain.html
A list of articles, books, and videos about touch.

www.tsbvi.edu/seehear/summer98/groovy.htm
This article describes how to make touch and investigating things with one’s hands fun and not a distasteful activity.
**Taste & Smell**

In this article, David Brown talks about the connection between taste and smell, demolishes some myths we have about taste, and explains why these two senses are crucial for students who are deaf-blind and how we can respond to a student’s interest (or lack of interest) in eating. He also mentions some things that are helpful when working with children who are on tube feedings.


This article addresses the sense of smell and how it may cause difficulties for some children by evoking emotions and memories. It also covers six things to consider for students who are deaf-blind.

This article summarizes the sense of smell and concludes with some good questions to ask yourself in relation to a student’s sense of smell.

**Proprioceptive & Vestibular Senses**


This article discusses the importance of the vestibular sense for people who are deaf-blind people, the way it works and its connection to the other senses.

This article is about proprioception, what it means for students who are deaf-blind, and how to provide proprioceptive input.

*What is proprioception*. [Blog Post]. Brainblogger.com
Short, easy-to-read description of proprioception.

**Sensory Integration**

Describes the theory of sensory integration as developed by Jean Ayres, sensory integration therapy, and how the senses of proprioception, the vestibular system, and touch are a part of the whole person, not isolated senses that need support.

The second part of this series focuses on how to adapt the sensory integration therapy approach to allow for deaf-blindness.

http://www.deafblindinternational.org/review1_i.html
Case studies of students with deaf-blindness and sensory integration challenges and solutions

This book chapter discusses the seven senses and their relationship to sensory integration theory and therapy. [Note: This item is not available on the web or in the resource folder. If you need help locating a copy, contact NCDB’s DB-LINK Information Services at 800-438-9376 or info@nationaldb.org.]

*What is sensory processing disorder?* [Video]
http://www.youtube.com/watch?v=6O6Cm0WxEZA
Sometimes you will hear people talk about sensory processing disorders or sensory integration. This short video (2:36 min) provides a general introduction.