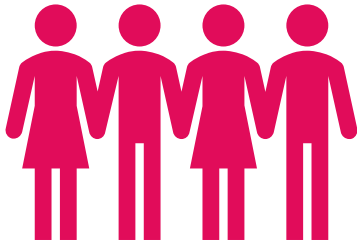




# Strategies and Resources for the Instruction and Evaluation of Tactile Graphicacy Skills



# Zoom Poll Questions



Who is with us today?



Where are you from?

# Using the Hive's Discussion Board as a PC

- **Existing User:** Sign in at [www.aphhive.org](http://www.aphhive.org)
  - Forgot password? Follow reset link.
- Go to Discussion Board link in the chat
- **New User:** Register at [www.aphhive.org](http://www.aphhive.org)
  - Create username & password
- Go to Discussion Board link in the chat



11/28/23

3:00–4:30 PM (ET)

# Strategies and Resources for the Instruction and Evaluation of Tactile Graphicacy Skills

**ACVREP  
Credits**

Jenny Wheeler  
Karen Poppe

The logo for Access Academy, featuring three diagonal lines in blue, pink, and orange, with the text "Access Academy" below them.

Access  
Academy



# Jenny Wheeler

- Regional Outreach Specialist – Southwest Region
- American Printing House for the Blind
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# Karen J. Poppe



- Braille and Tactile Literacy Product Manager
- American Printing House for the Blind
- [kpoppe@aph.org](mailto:kpoppe@aph.org)



# Learning Objectives

- Participants will describe a variety of instructional strategies pertinent to effective tactile graphics reading and tactual perceptive skills.
- Participants will explore methods of tactile graphics creation that will provide students with greater understanding and increased tactile perceptual capability.
- Given an overview of available resources and tools for tactile graphics learning, participants will be able to evaluate their students' tactile perceptual capability and identify new areas for development and progression.



# Resources for Teaching Tactile Literacy

- [Braille Readiness Grid](#)
- [Teaching Touch Kit](#)
- [Mangold](#)
- [Setting the Stage for Tactile Understanding Kit](#)
- [Oregon Project](#)
- [Family Connect Website](#)
- [Outreach@APH.org](#)
- [Tactile Graphic Image Library](#)
- [Tactile Treasures Kit](#)
- [Because Pictures Matter](#)
- [Quick Draw Paper](#)





# BRAILLE LITERACY AND TACTILE GRAPHICACY



# What is Braille Literacy?

Ability to access, comprehend, and produce symbolic (written) language through touch

## Requires:

- Fine motor sensitivity and dexterity
- Efficient use of carefully constructed knowledge
- Variety of tactile-cognitive strategies



# Tactile vs. Tactual



- Tactile = word that describes a thing that can be touched
  - Tactile graphic – Tactile map – Tactile system
  - **Static:** Tactile objects or surfaces do not engage and must be acted upon

# Tactile vs. Tactual (continued)

- Tactual = word that describes the physical (biological) sensation of touch
  - More abstract and conceptual
  - Involves all parts of the body, as well as the whole physical framework, that experience touch, perception, and discrimination
  - **Dynamic:** The tactual sense is the acting agent that engages the power of tactile objects



# Characteristics of Braille Literacy



- Curiosity for exploring and discovering with the hands
- Interest in perceiving, decoding, and utilizing tactile information
- Capability to track fluently across lines of text
- Systematic movements with both hands
- Multiple fingers on each hand

# Characteristics of Braille Literacy (continued)

Understanding how a book works

- Beginning, middle, end
- Titles, headings, and paragraphs

Left-to-right, top-to-bottom progression

- Knowing what to look for on a page
- Ability to preview/anticipate information
- Ability to return to and review information



# What is Tactile Graphicacy?

Ability to access, comprehend, and produce tactile graphics or raised line drawings

## Requires:

- Fine motor sensitivity and dexterity
- Efficient use of carefully constructed knowledge
- Variety of tactile-cognitive strategies



# Characteristics of Tactile Graphicacy

- Perception that there are different kinds of symbolic information on a page with different kinds of meaning
- Ability to discriminate between different tactile surfaces and to draw meaning from them
- Advanced form of tactile literacy
- Not inherent for tactile readers
- Requires explicit attention, education, and careful building up of skills





# Importance of Tactile Graphics



## Children love pictures and symbols

- Focus for attention and perception
- Natural destination for conversation and social interaction
- Place where creativity and imagination are fostered first
- Pictures invite and motivate children's curiosity and active engagement

# Benefits of Graphicacy Skills

- Build confidence
- Provide pathways to retain and memorize information
- Develop more sensitive fine motor skills, finger strength, and exploration techniques



# Benefits of Graphicacy Skills (continued 2 of 3)



**Pictures clarify and reinforce text content through symbolic representation**

- Setting
- Characters
- Plot
- Dialogue
- Conflict and resolution
- Different viewpoints

# Benefits of Graphicacy Skills (continued 3 of 3)

- Organize verbal information and create mental scaffolds
  - Stories are more concentrated, concrete, coherent, and comprehensible
- Enhance language, literacy, and social development
- Children learn to use symbols to tell their own stories
- Wider variety of study and career options available (Curtin et al., 2019, p. 82-84; Bara, 2013)



# SYSTEMATIC INSTRUCTION: PRINCIPLES, TECHNIQUES, AND STRATEGIES



# Guiding Principles

- All students should receive substantial, systematic, scaffolded instruction throughout the elementary and secondary grades on interpreting and utilizing tactile graphics
- With specialized training, even very young children with visual impairments can learn to comprehend, enjoy, and problem-solve with tactile graphics
- Individualization is vital, but there are effective teaching patterns, techniques, and basic skills that are universal



# Where Do I Start?

- Graphics instruction is an ongoing process, never exactly begun or complete
- **There is always something new to learn!**
- Create a plan for each student that will make graphics learning a consistent part of their educational experience



# Where Do I Start? (continued)

- Tactile graphics appear in student texts, worksheets, and assignments as early as kindergarten
- Older students may need special assistance with catching up if there are gaps in graphics education
- At any age, systematic graphics learning begins with awareness, perception, and development of exploration techniques
- **Key to success:** Teach students to find joy in discovery and problem-solving





# Tactile vs. Visual Learning



## **Visual learning: Simultaneous perception**

- Eyes give detailed information and overall impression all at once

## **Tactual learning: Sequential perception**

- Touch does not give an instant "bigger picture"
- Things must be explored a piece at a time and the pieces fit together

# Tactile vs. Visual Learning (continued 2 of 6)

- A tactual learner typically experiences the world in three dimensions, not two
- Small objects are explored by enclosing them in the hands, enabling a view of front, back, and all sides or portions
  - Complete exploration yields a whole picture
- Larger objects must be turned or walked around, and parts examined until a whole picture is obtained

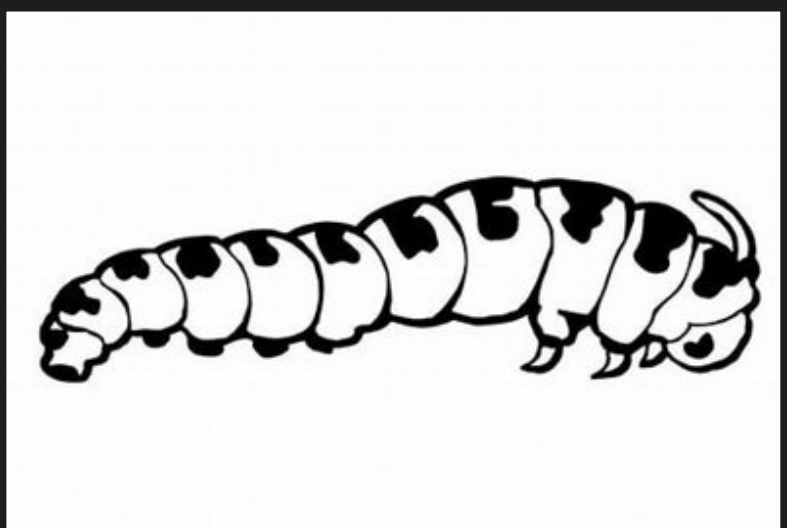
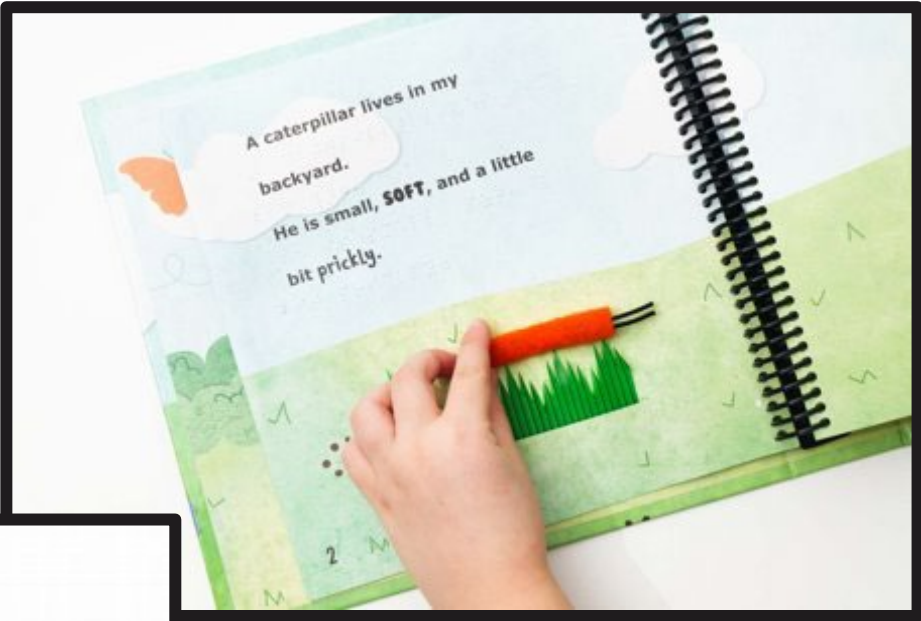


# Tactile vs. Visual Learning (continued 3 of 6)

- When three-dimensional objects are rendered in a two-dimensional format, they are not the same for a tactual reader
- Two-dimensional representations are not automatically or easily recognized
  - Each three-dimensional experience must be transferred mentally onto a flat surface
  - The meaning of each line, curve, shape, and symbol must be learned



# Tactile vs. Visual Learning (continued 4 of 6)



# Tactile vs. Visual Learning (continued 5 of 6)

Touch relies on memory skills and concentration

- If concentration fails during exploration or parts are mentally put together in the wrong order, the final picture is distorted

The brain's capacity and tactual library grows with time

- At first, the same things may need to be explored many times and in different ways

This is a labor-intensive process, especially in the beginning

- Slowing down allows for greater accuracy in tactile impressions



# Tactile vs. Visual Learning (continued 6 of 6)

- Each new type of information requires a similar approach
- **Greater speed and ability come with mental assembly of many experiences**  
(Withagen et al., 2010)



# Mechanics



- Use both hands and multiple fingers on each hand
- One hand can be used temporarily to examine an image while the other hand reads and returns to related text information
- Use a variety of exploratory procedures, movements, search techniques, and strategies (Rosenblum et al., 2018, p. 482; Bara, 2013; Vinter, 2012, 1820)

# Movements and Search Techniques

- **Contour following:** Tracing an edge or outer boundary of a shape
- **Enclosure of the global shape:** Molding the palm and pads of the fingers to the outer boundaries of the whole shape, enclosing it within the hand
- **Enclosure of local shapes:** Molding the tips of the fingers to the boundaries of part of a shape or tactile pattern
- **Pinch procedure:** Holding the edge of a shape or tactile pattern in a pincer grip between the thumb and one or more fingers





# Movements and Search Techniques (continued)

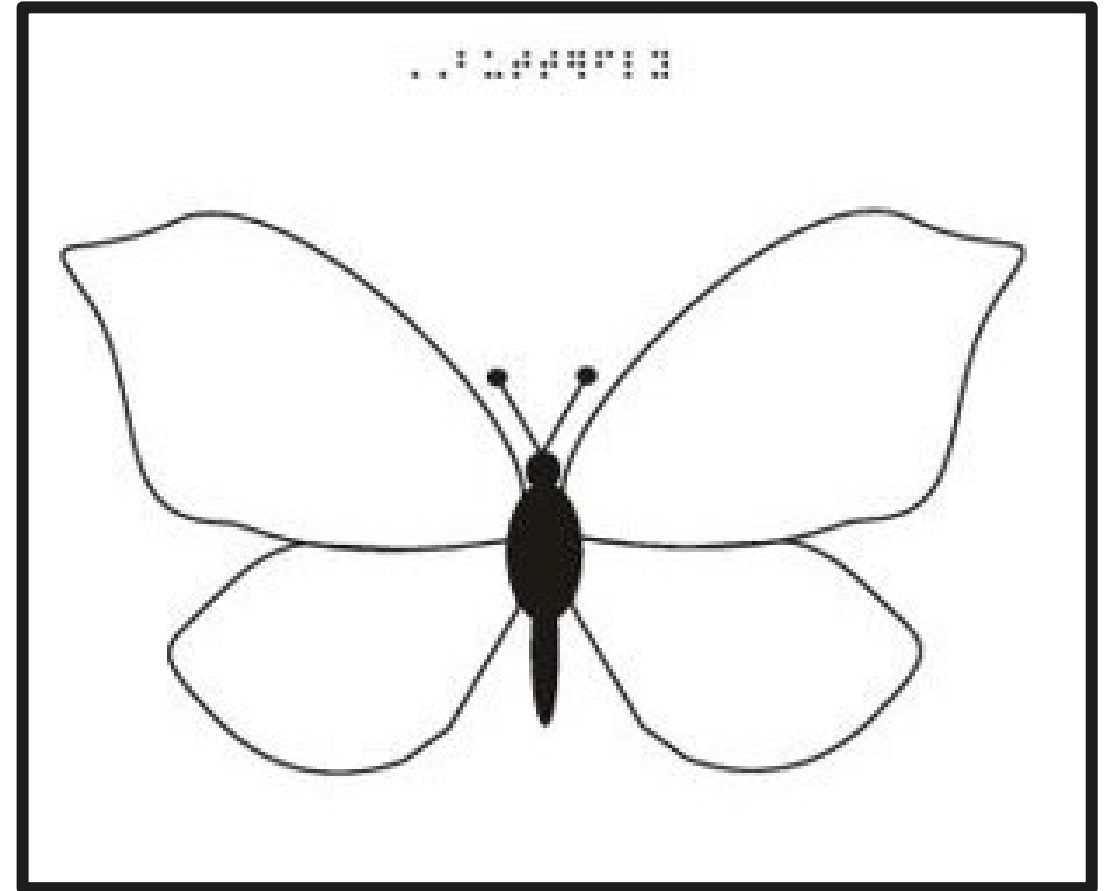
- **Surface sweeping:** Movement of the fingers and/or palm over an image's surface
- **Static contact:** Stationary contact with an image's surface (i.e., resting a finger, group of fingers, palm, or the whole hand on a shape or tactile pattern without movement)
- **Symmetrical movements:** Symmetrical finger displacements (movements) around a tactile pattern or shape using both hands (Vinter et al., 2012, 1823)



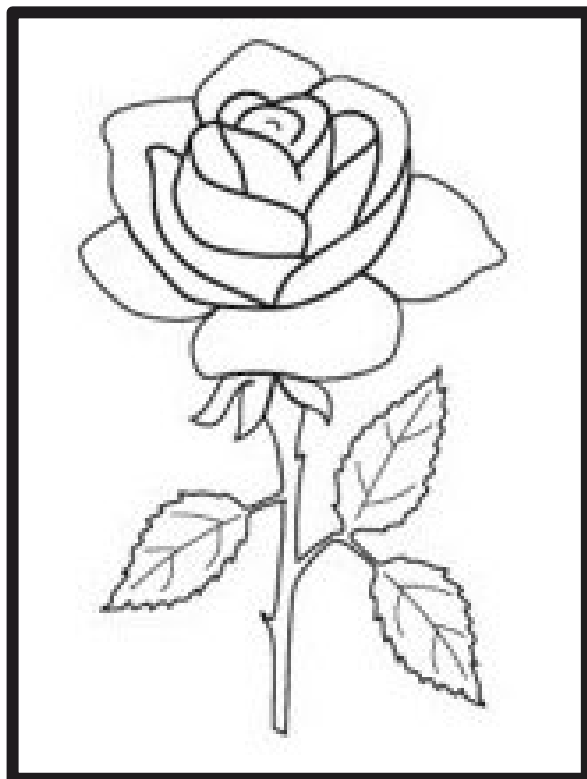
# Exploration Strategies

## Grid

- Systematic horizontal and vertical movements to locate all elements in the graphic
- Top-to-bottom, left-to-right in a grid-like pattern



# Exploration Strategies (continued 2 of 4)



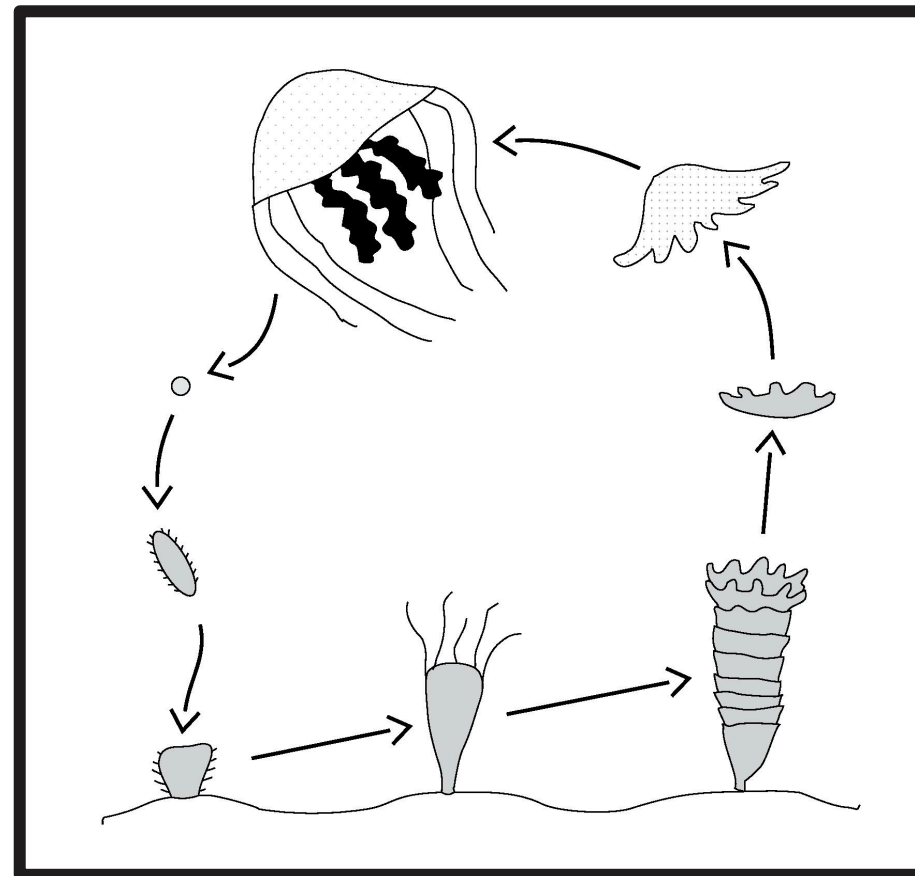
## Perimeter

- Follow the outer boundaries or outline(s) of the graphic
- Identify main elements based on their shapes or other tactile characteristics
- Organize a mental concept according to the whole before examining the parts

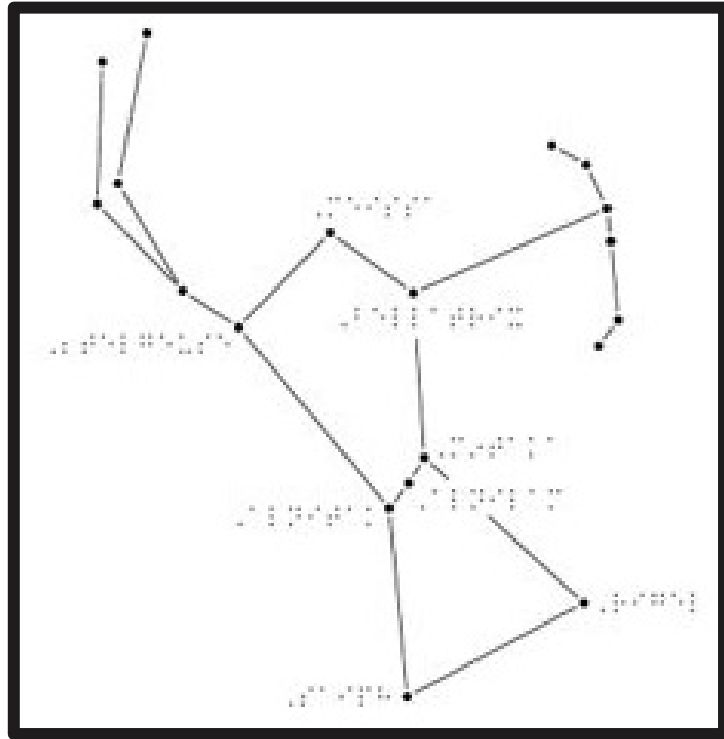
# Exploration Strategies (continued 3 of 4)

## Cyclic

- Identify a starting position inside or on the outer boundary of the graphic
- Use cyclic patterns to move outward
- Browse a series of elements, then return to the starting position
- Memorize the relative location of different elements



# Exploration Strategies (continued 4 of 4)



## Reference point

- Identify an easy-to-locate reference point based on an outstanding graphic characteristic or position
- Examine different elements of the graphic located around the reference point
- Understand the relationship between graphical elements using the reference point
- Build a full mental image of the graphic (Zhao et al., 2021)

# KEY ELEMENTS OF GRAPHICS LEARNING



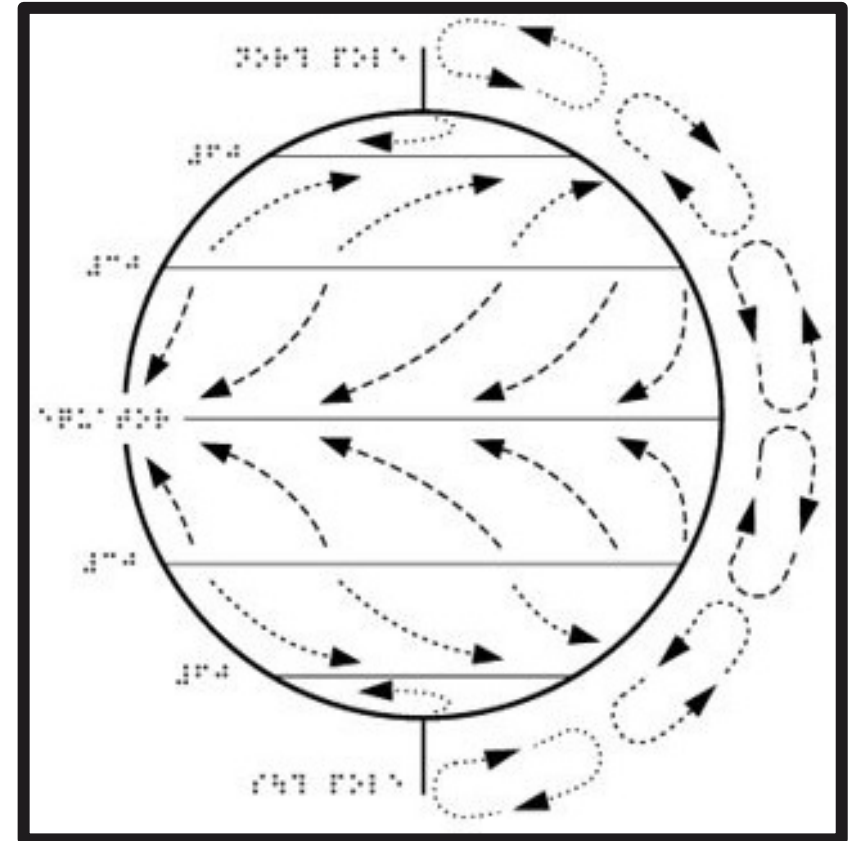
# Develop a Decision-Making and Mental Graphic Concept

- Ask guided, problem-solving questions
  - What am I looking at?
  - What am I looking for?
  - What exploration strategies or search techniques will I use?
- Look for cues that will provide meaning about a graphic
- Put together an entire picture one area or group of areas at a time



# Recognize That Graphic Elements Have Symbolic Purposes

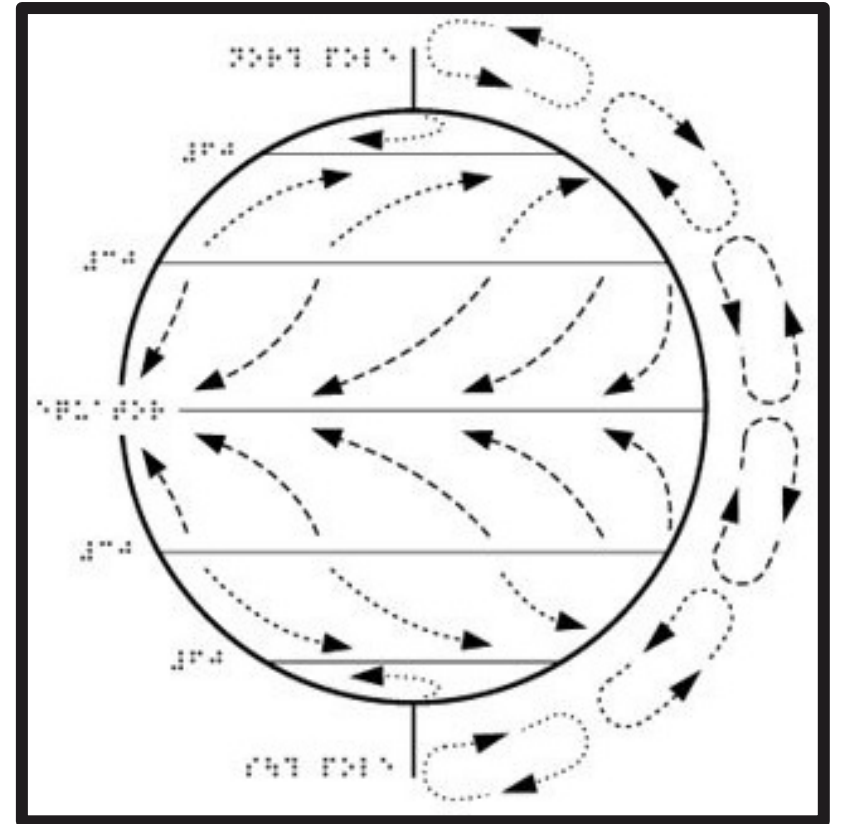
- Straight lines
- Curves, waves, and zigzags
- Solid, dotted, and dashed patterns
- Circular, semicircular, and spiral patterns





# Recognize That Graphic Elements Have Symbolic Purposes (continued)

- Point symbols
- Area textures
- Shapes with and without corners
- Arrows, lead lines, and use of directional symbols



# Connect Labels with Graphic Elements



- Labels provide the explicit meanings for symbolic points, lines, textures, shapes, and patterns
- **It is not always easy to identify what labels correspond to!**
- Help students use context clues and exploration strategies to attach labels to graphic elements and comprehend their intent

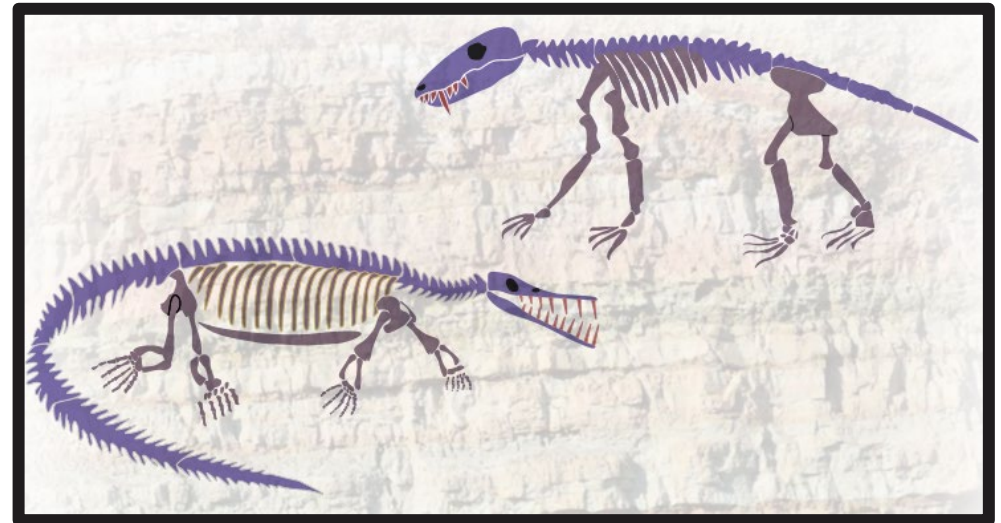
# Part-to-Whole Assembly

- Tactile graphics use simple features or symbols to represent the whole
- Link graphic representations to a child's experiences
- Pair verbal explanations, cues, and descriptive words with independent or semi-independent exploration
  - Students are more active in their exploration when they must search for, identify, and interpret graphic elements than when they are told where and what things are



# Identify Reference Points

- **Details are examined, compared, and coordinated around reference points**
- Anchor or fixed points in a graphic
- Make orientation easier and more efficient
- A place to start
- A place to return to



# Fully Utilize Context and Content

- Use information prior to and after a graphic image to understand its context, whole, and parts
  - Titles, headings, related text, captions, graphic descriptions, keys, and transcriber's notes
  - Comprehension questions
- Explain the parts of the graphic as they relate to text information
- Use comprehension questions to guide exploration



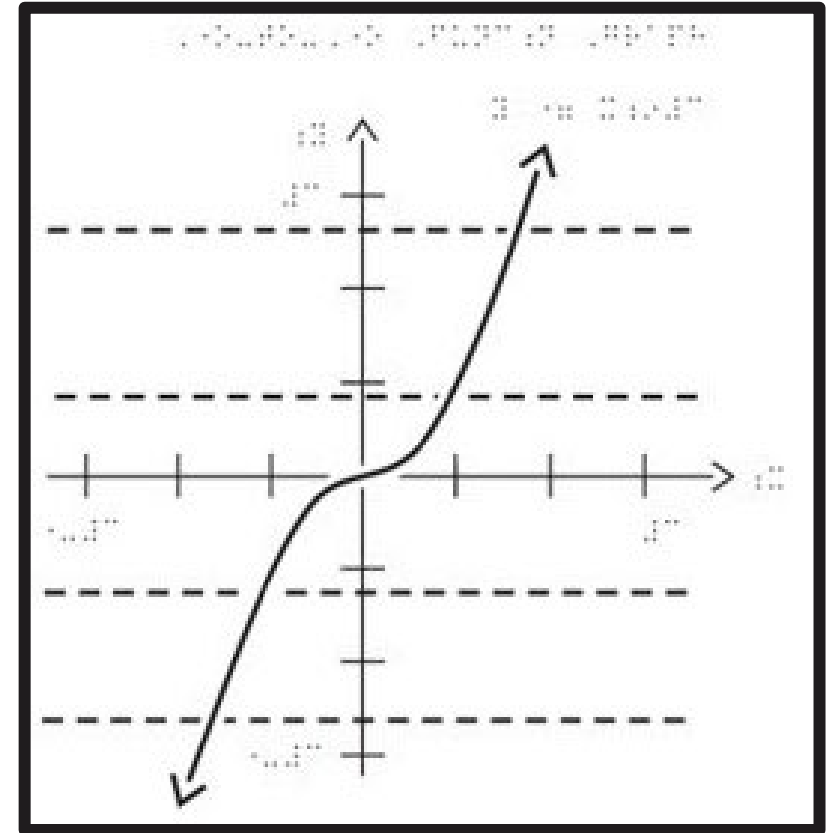
# Fully Utilize Context and Content (continued)

- Spend time understanding the content before going to the graphic to locate information
- Identify the purpose and use of the graphic from the content
- Write down or verbalize the information that is needed to solve a problem or answer a question
- Focus specifically on the features in the graphic that will increase text understanding, not distract from it

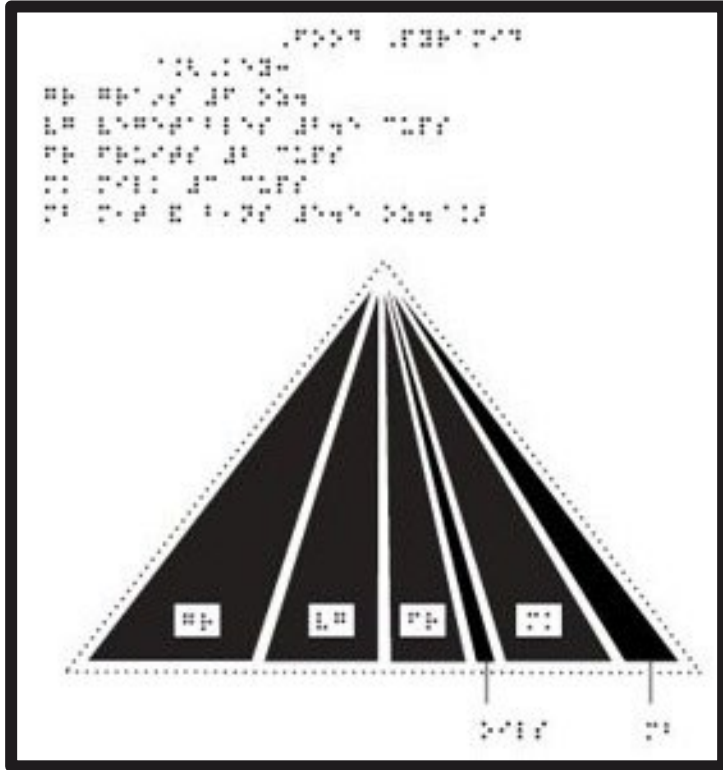


# Understand Coordinate Graphs

- Graph boundaries
- Labels for the y- and x-axes
- Scales for y- and x-axes – describe increments and differences between scales
- Graph lines or curves – trace from beginning to end and identify their direction
- Location of points and identification of their meanings



# Locate and Use Graphic Keys



- Symbolic representations of words, phrases, and concepts
- Can be textual or pictorial
- Read the whole key first
- Distinguish between key labels and other graphic elements (line paths, points symbols, textures/areas)
- Shift between a graphic and a key
- Pair graphic labels or symbols to the key



# GOALS AND EVALUATION



# Goals

Identify a target skill or group of skills that needs attention

- Depends on student pacing

Write goals that have reference to classroom activities and needs

- Talk with classroom teachers about grade-level expectations

Be proactive

- Teach skills ahead of need to provide practice before real-time performance is necessary



# Evaluation

- Be as systematic in evaluation as in instruction
- Have a consistent, easy-to-follow procedure for student assessment
- Include an element of assessment in every lesson
- Adjust future lesson plans based on student progress
  - Need for additional practice
  - Identification of undetected "splinter skills" that may exist



# Evaluation (continued 2 of 3)

- Evaluation should guide educational planning
  - Pre-assessment
  - Post-assessment
- Consult with the team (especially parents!)
  - Describe successes and challenges
  - Adapt according to feedback and report back
  - Keep lines of communication open



# Evaluation (continued 3 of 3)



- **Assess older students who lack graphics skills when they arrive**
- Identify gaps in tactile graphics learning
- Begin with awareness, perception, and ability to use systematic exploration strategies
- Create a plan to address these gaps
- Use grade-level content to drive plan development

# Questions to Ask in Graphics Evaluation

- Does your student have the mechanics necessary to sufficiently explore and interpret all parts of a graphic?
- Is your student able to verbalize and enact the steps in a systematic search for information?
- Can your student ignore clutter and find the important information in the graphic?



# Questions to Ask in Graphics Education (continued)

- Does your student have a clear and organized decision-making process?
- When your student reaches a mental or physical barrier, can they think through and solve problems?
- Can your student relate information in the text or related questions to the graphic?
- Is your student comprehending the text content sufficiently to be able to use the graphic as required? (Rosenblum et al., 2018)





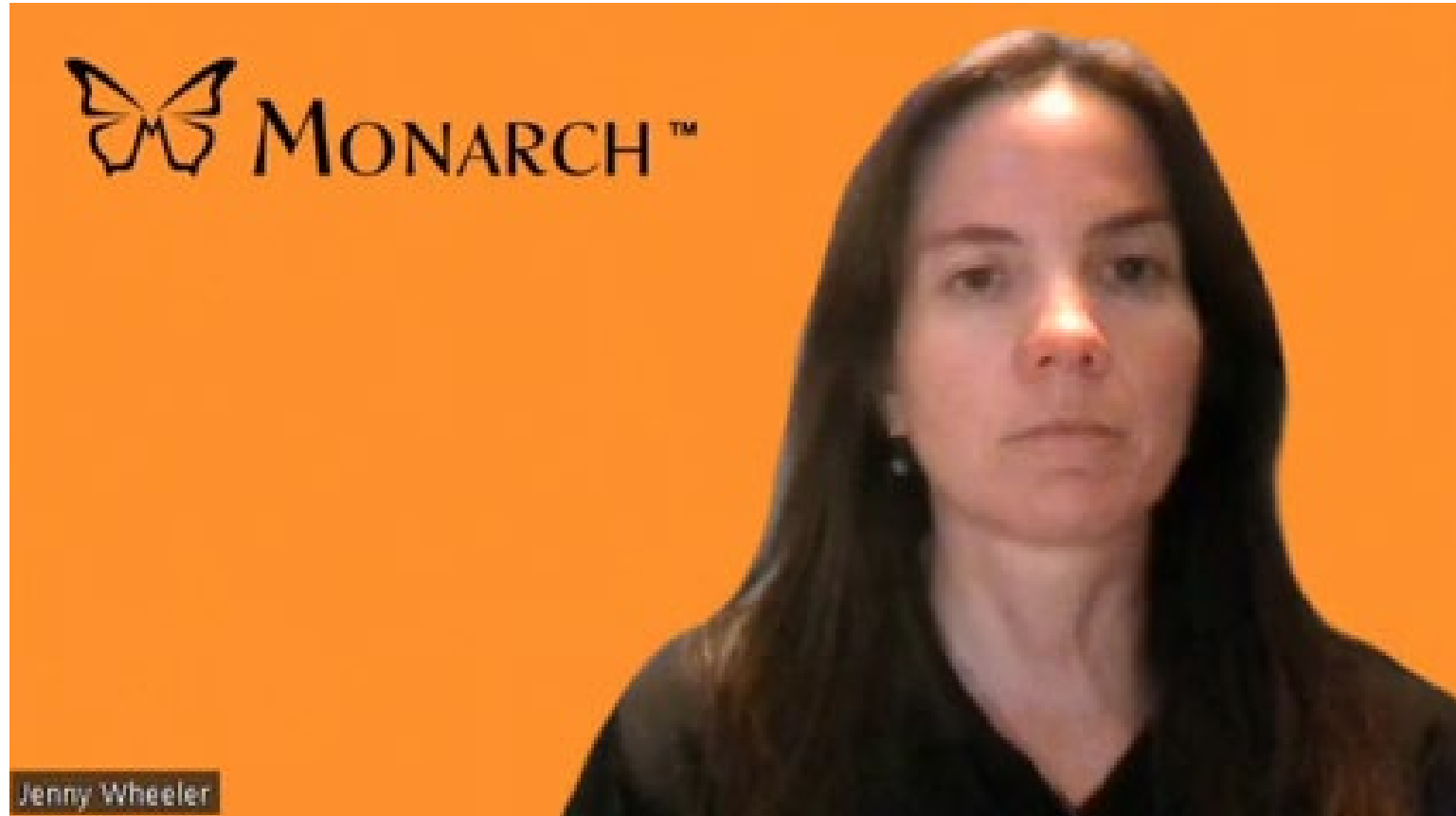
# INTERVIEW: PERSPECTIVES ON TACTILE GRAPHICS LEARNING

Dan French, Braille Transcriber,  
Arizona Schools for the Deaf and Blind (ASDB)

Stephanie French, TVI and COMS,  
Arizona Schools for the Deaf and Blind (ASDB)



# Dan and Stephanie French: Perspectives on Tactile Graphics Learning



# TOOLS TO SUPPORT GRAPHIC LITERACY



# Exploration of Real Objects



# Symbolic Understanding

REAL OBJECT



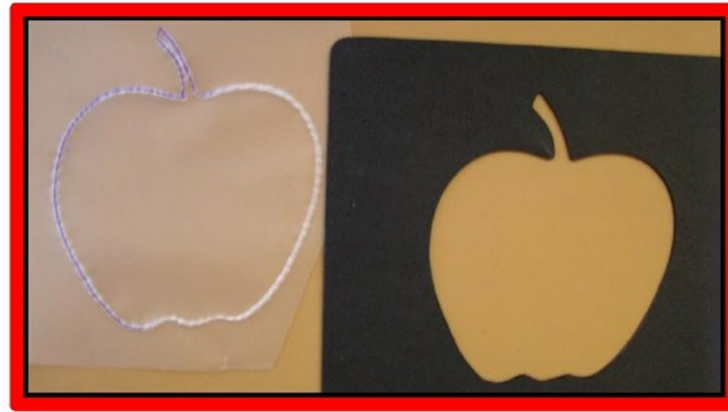
MODEL



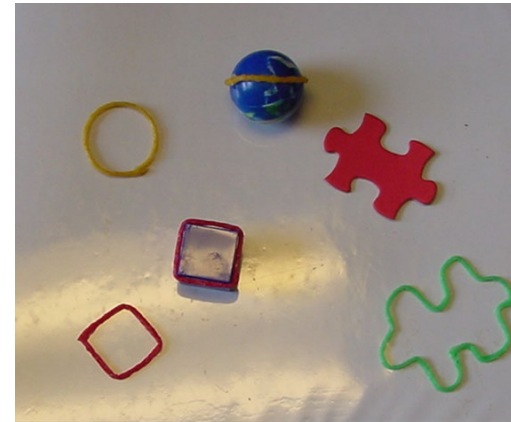
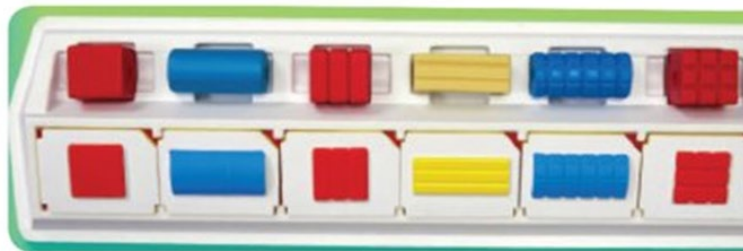
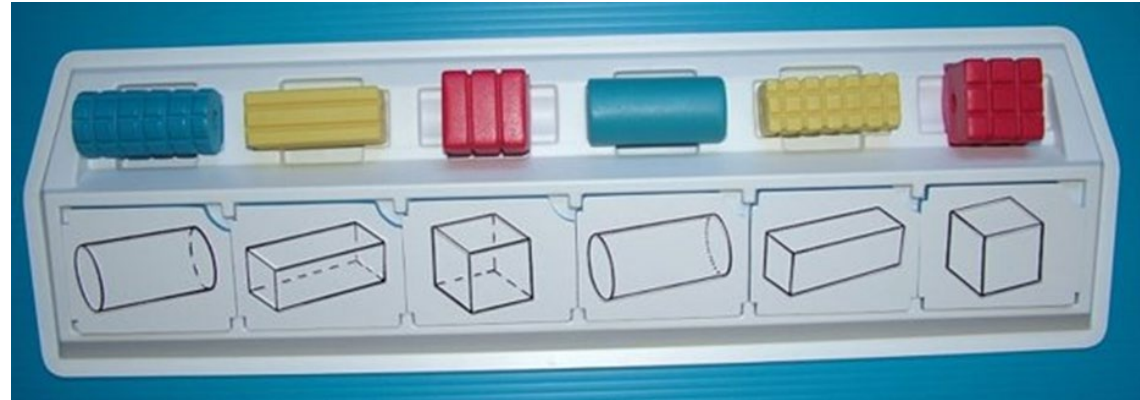
TACTILE  
DRAWING



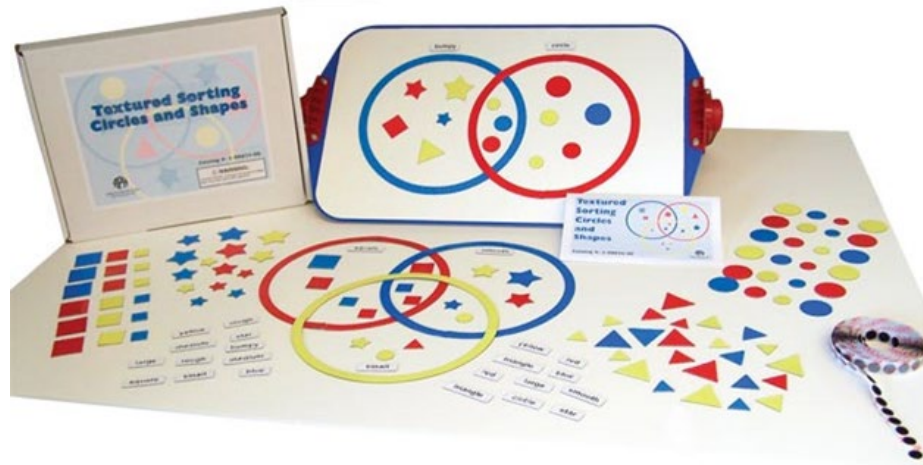
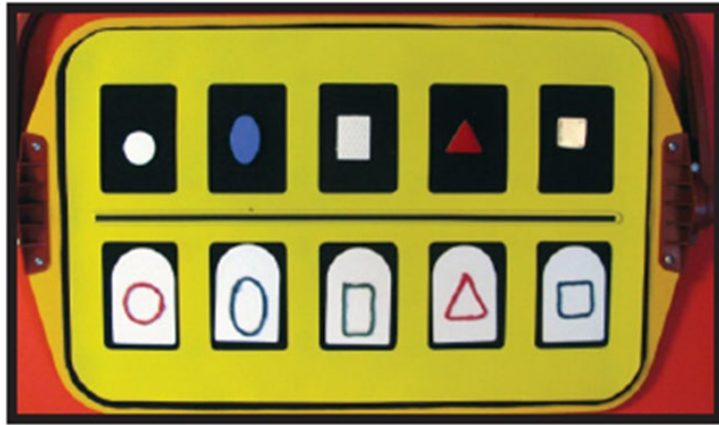
# 3D to 2D Representation



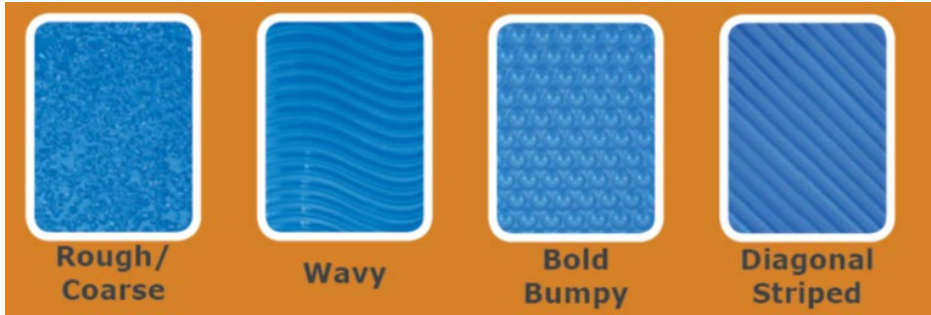
# 3D to 2D Representation (continued)



# Shape Recognition

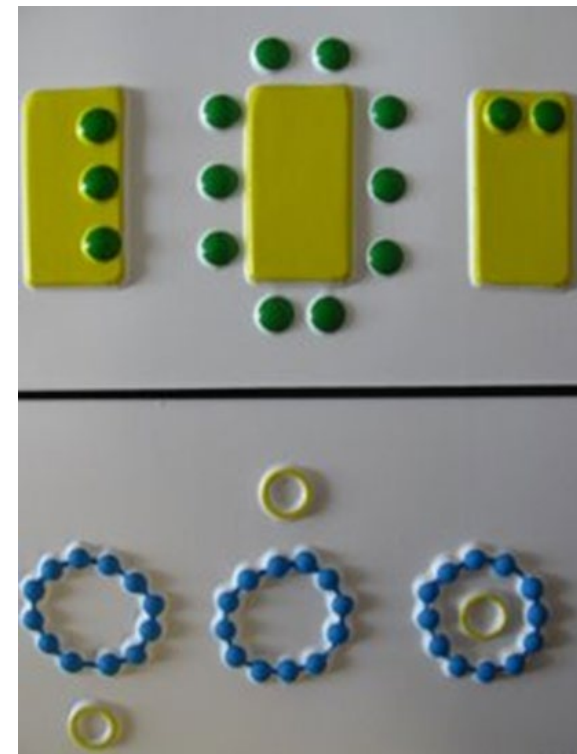
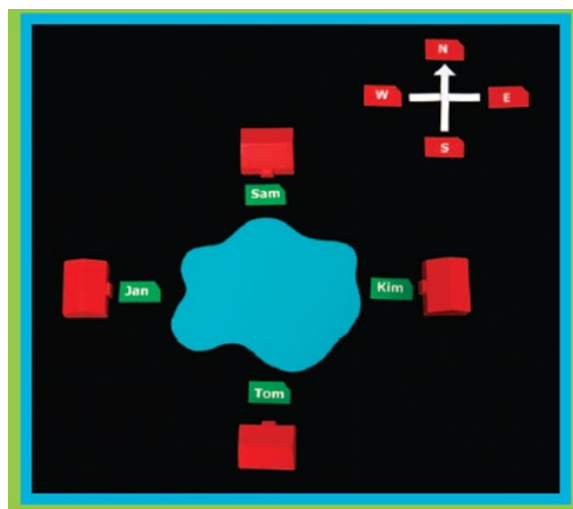
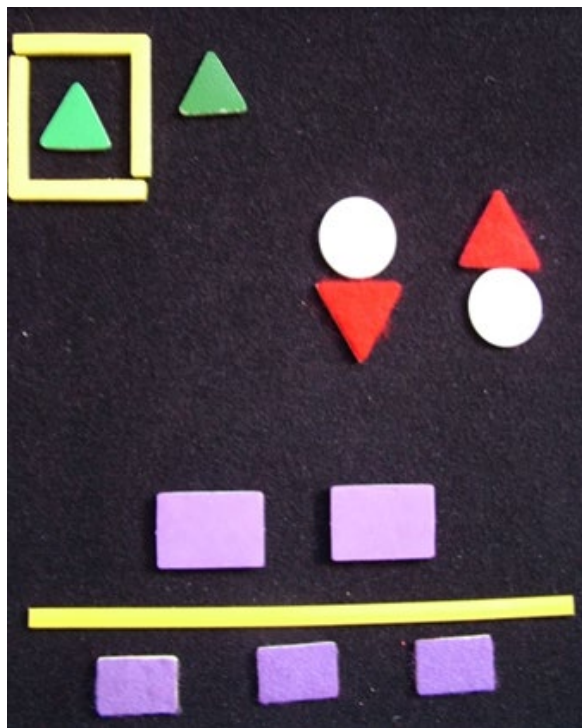


# Texture Discrimination

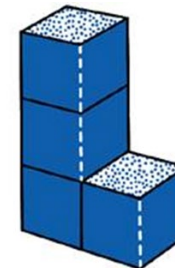
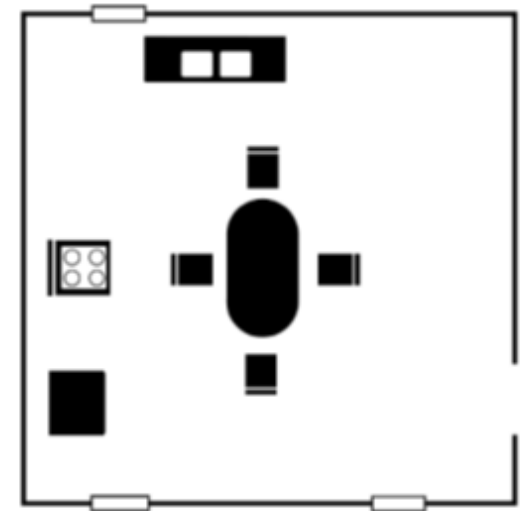
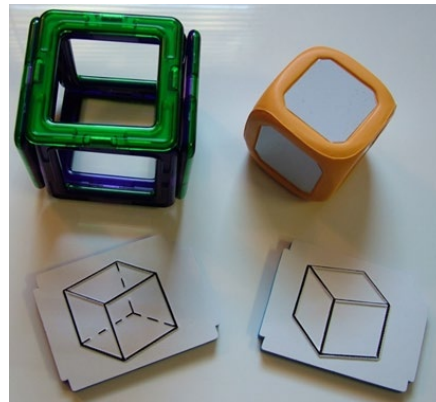
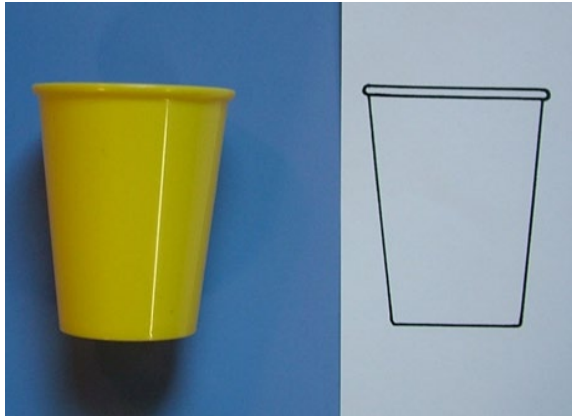
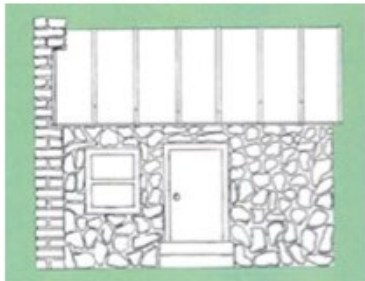
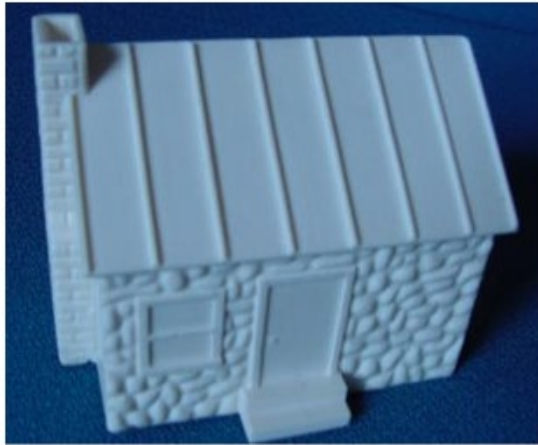




# Understanding Spatial Concepts



# Understanding Perspective



Front View



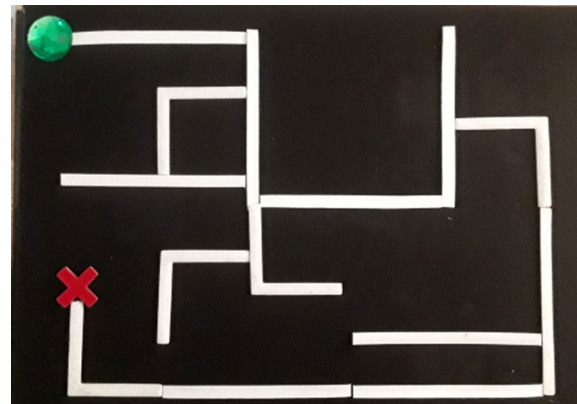
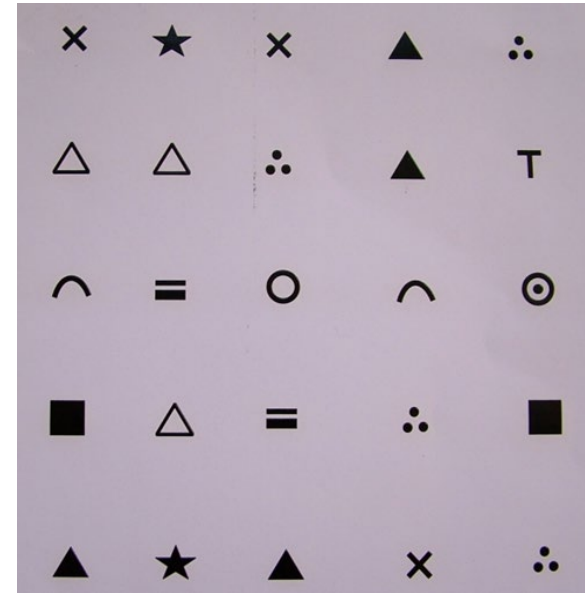
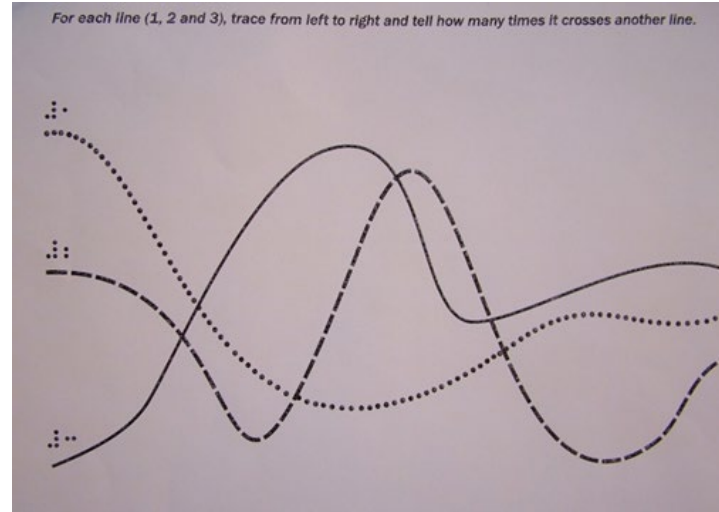
Right Side



Top View

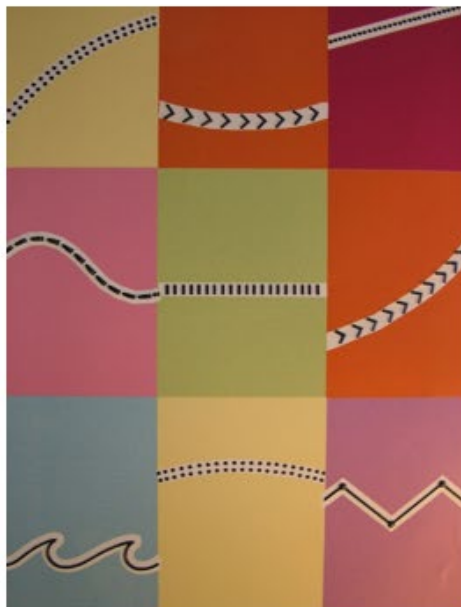


# Line Tracking and Scanning Techniques

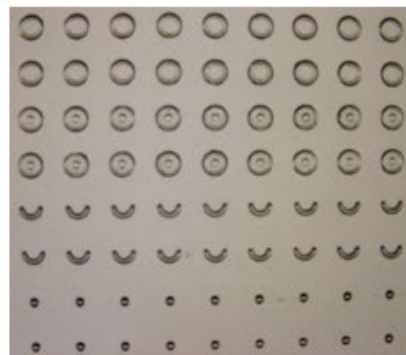


# Familiarity with Tactile Terminology

**Line Paths**



**Point Symbols**



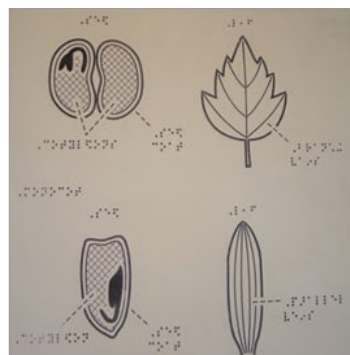
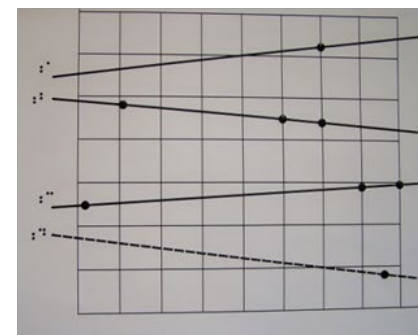
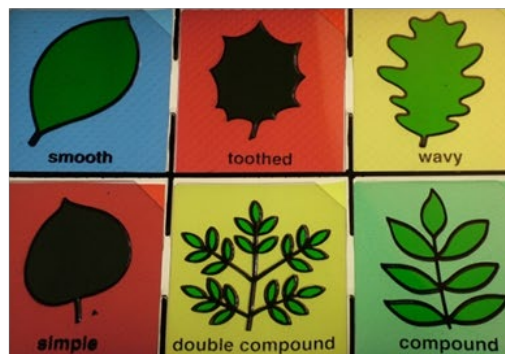
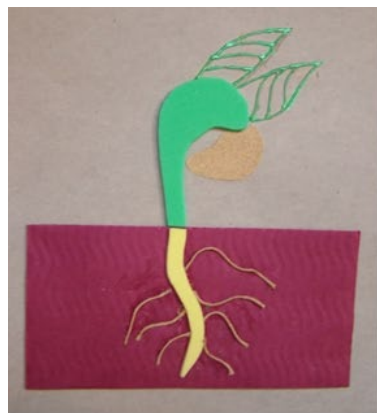
**Textures/Areal Patterns**



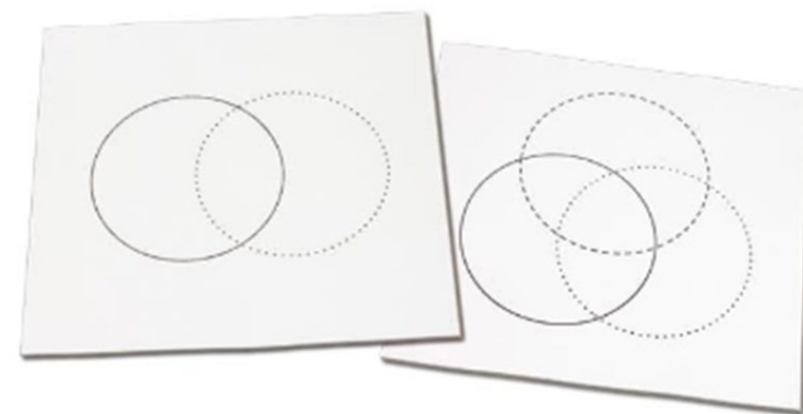
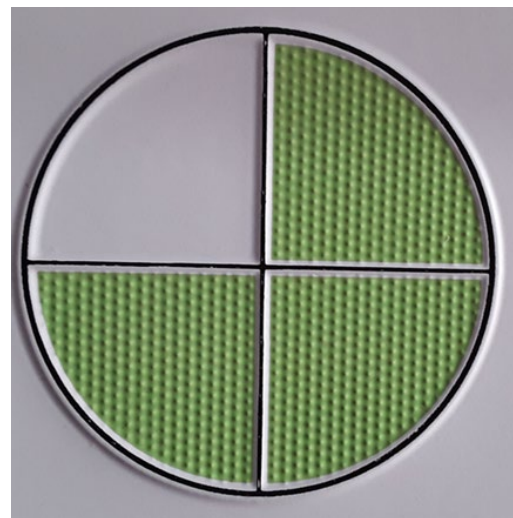
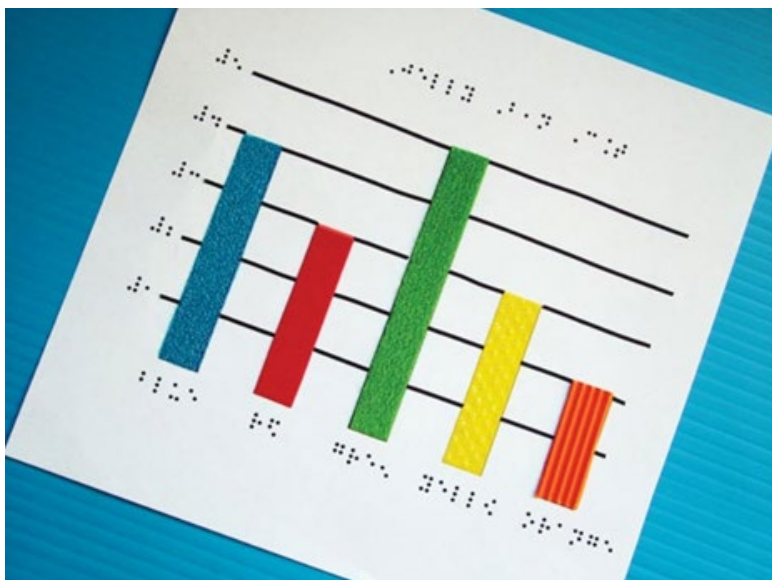
**Labels**



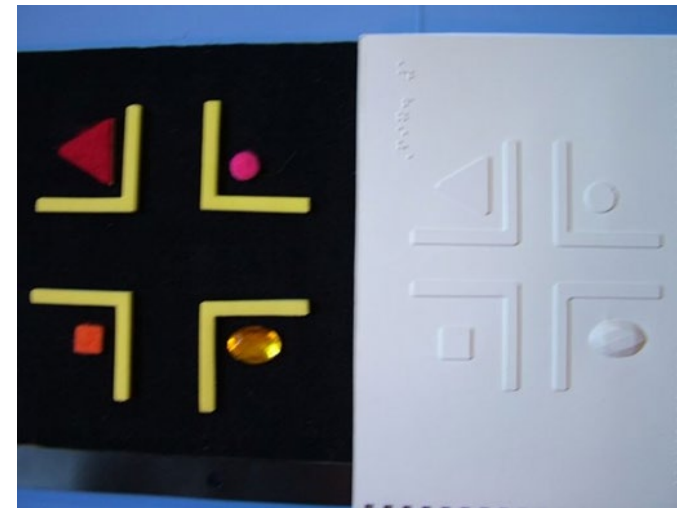
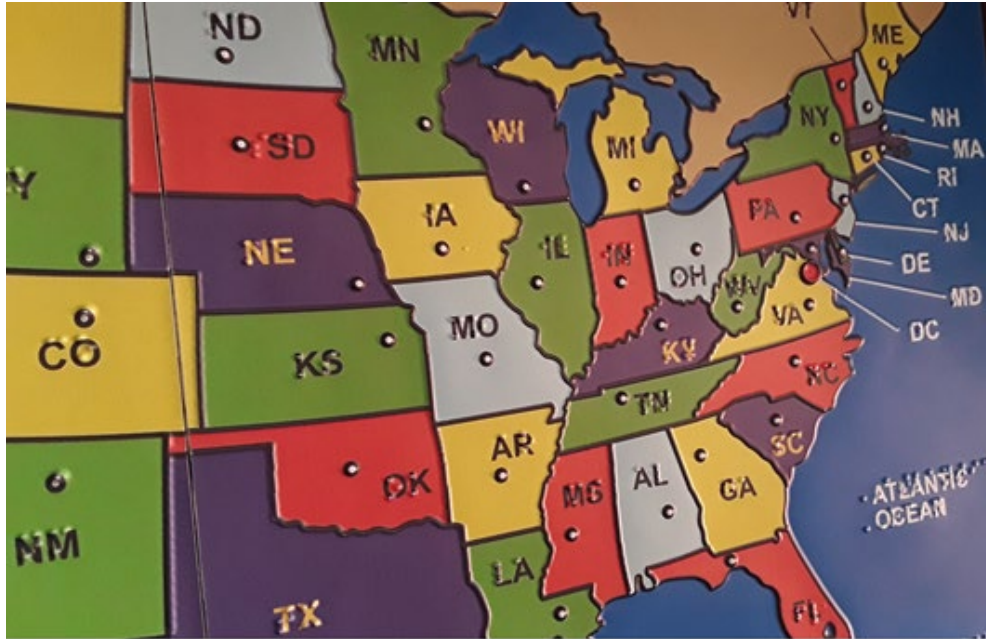
# Experience with Tactile Graphic Methods



# Reading Graphs and Charts



# Reading Maps



# Interpreting Keys and Legends





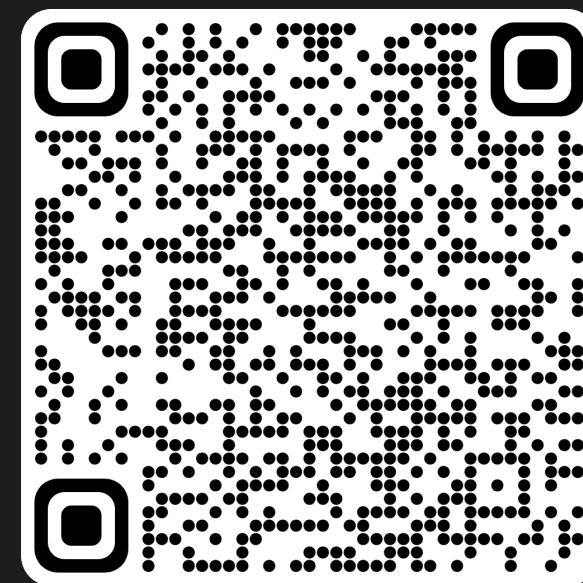
# CREATING TACTILE GRAPHICS





# HIVE Discussion Board Activity

What tools do your students use independently to create tactile graphics?



# Why Should Students Create Tactile Graphics?

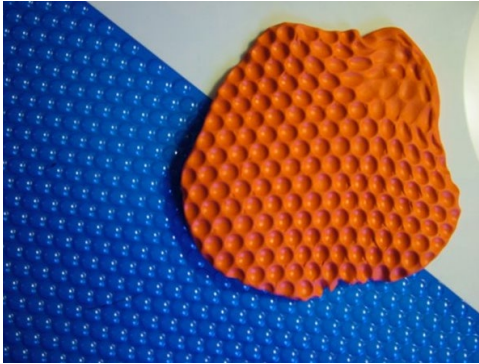
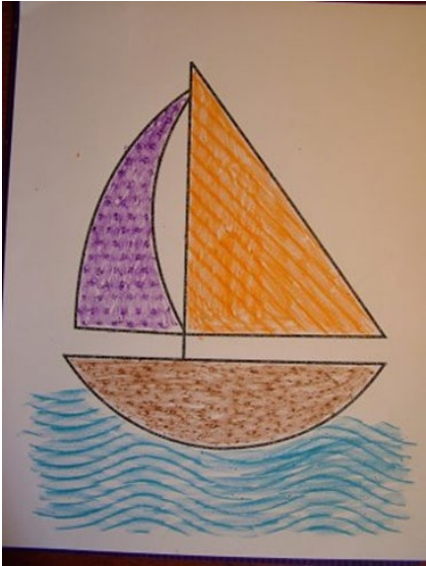
- Graphics creation helps students to:
  - Be active participants in graphic creation--design their own maps, graphs, diagrams, and artwork
  - Build creative thinking and decision-making skills
  - Make independent choices
  - Learn to identify and follow lines and the outlines of shapes
  - Develop spatial orientation and understanding
  - Jumpstart symbolic understanding (Rosenblum et al., 2018)



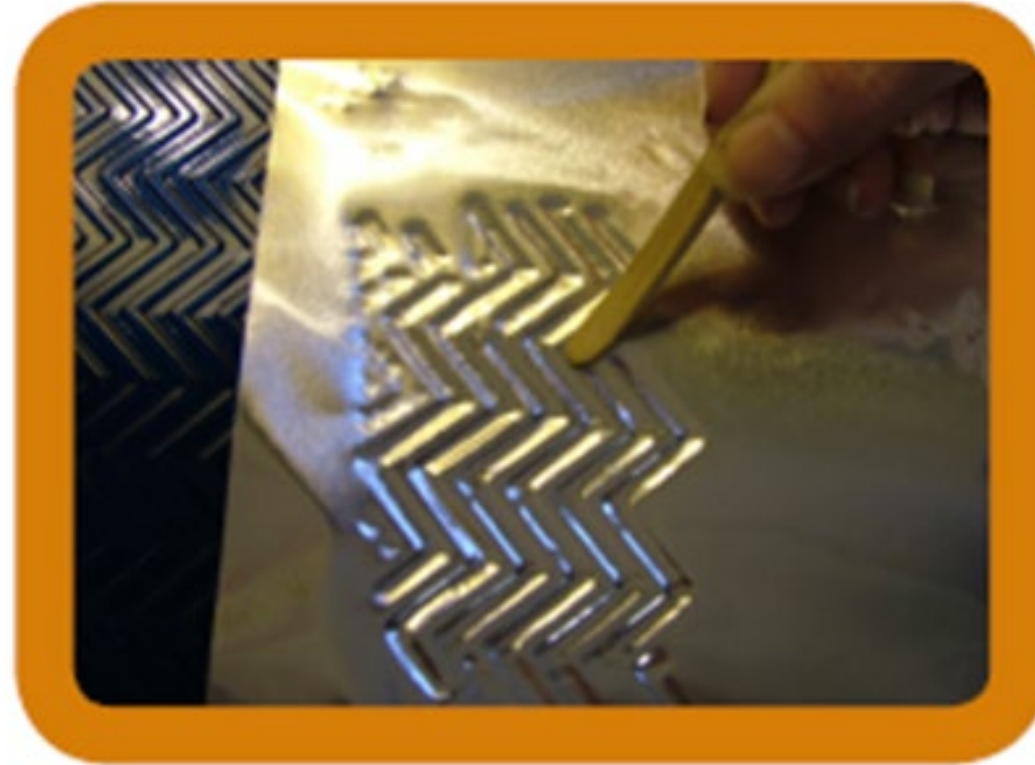
# Quick-Draw Paper



# Textured Marking Mats for Coloring



# Heavy-gauge Aluminum Diagramming Foil



# Tactile Drawing Boards



# Collage Materials





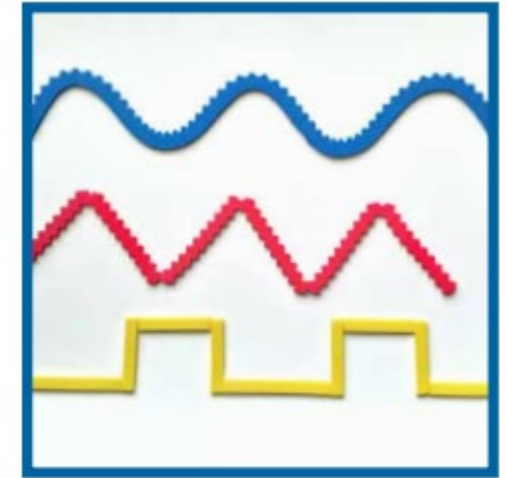
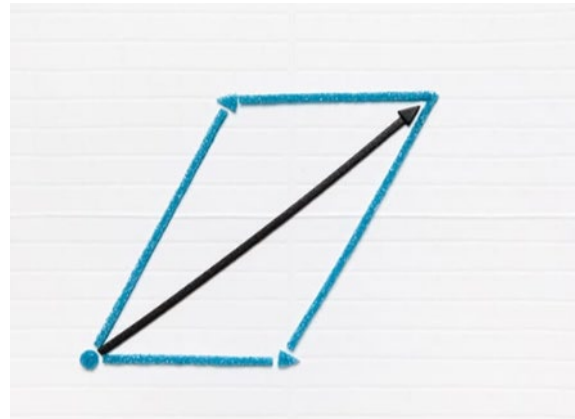
# Interactive Tactile Boards



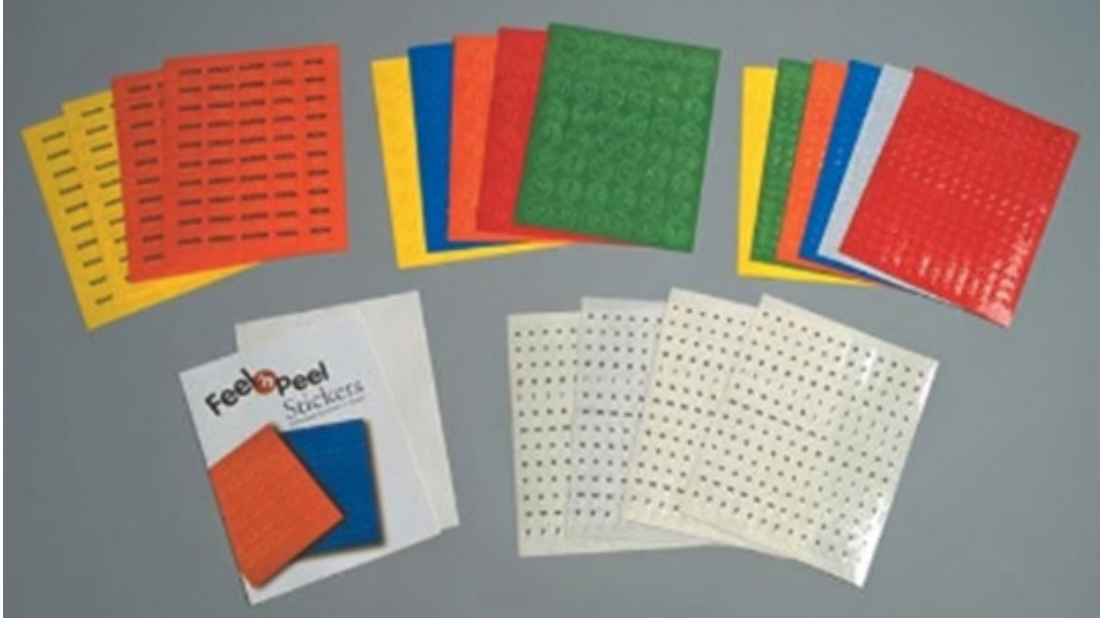
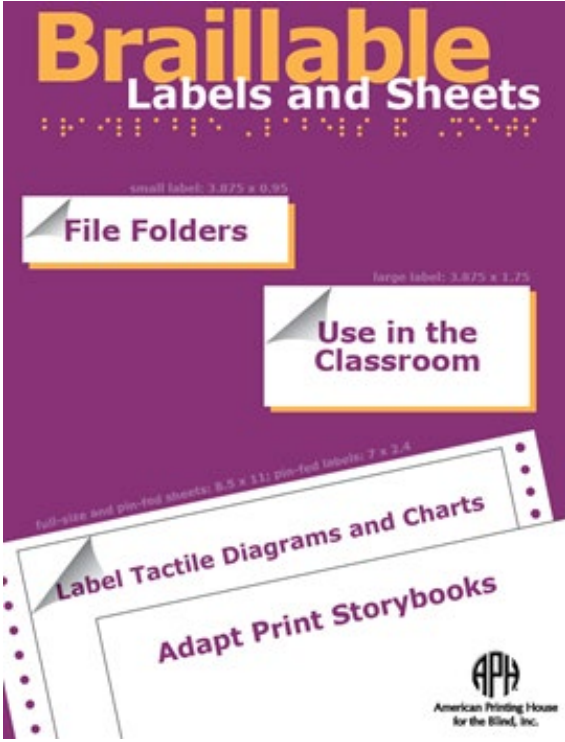
# Tactile Line Drawing Tools



# Graphic Art Tape



# Tactile Labeling Material and Stickers



# Other Materials for Creating Graphics

- Perkins brailler
- Puffy fabric paint
- Modeling clay/Playdoh
- Cork or rubber boards with pins and rubber bands
- Magnetic shapes
- Variety of craft materials (yarn, string, ribbon, sandpaper, craft foam adhesive shapes, textured paper, etc.)



# RESOURCES AND REFERENCES



# Tactile Skills Progression Matrix



# Resources

- APH Access Academy
  - [Access Academy | American Printing House \(aph.org\)](https://aph.org)
- APH Hive
  - [Home - APH Hive](#)





# References

- Bara, F. (2013). Exploratory procedures employed by visually impaired and blind children during joint book reading. *Journal of Developmental and Physical Disabilities*, 151.
- Curtin, L., Lewis, D., & Holloway, L. (2019). Documenting tactile graphicacy. *Journal of the South Pacific Educators in Visual Impairment*, 12(1), 82-98.
- Rosenblum, L. P., Cheng, L., & Beal, C. R. (2018). Teachers of students with visual impairments share experiences and advice for supporting students in understanding graphics. *Journal of Visual Impairment & Blindness*, 112(5), 475-487.



# References (continued 2 of 3)

- Vinter, A., Fernandes, V., Orlandi, O., & Morgan, P. (2012). Exploratory procedures of tactile images in visually impaired and blindfolded sighted children: How they relate to their consequent performance in drawing. *Research in Developmental Disabilities, 33*, 1819-1831.
- Withagen, A., Heins, L., Blok, A., Betten, A., Buurmeijer, A., Mul, M., & Oosterlaak, L. (2010). *In Touch: Helping Your Blind Child Discover the World*. Royal Dutch Visio, Centre of Expertise for blind and partially sighted people.



# References (continued 3 of 3)

- Zhao, K., Bardot, S., Serrano, M., Simonnet, M., Oriola, B., & Jouffrais, C. (2021, May). *Tactile fixations: A behavioral marker on how people with visual impairments explore raised-line graphics*. CHI 2021: Conference on Human Factors in Computing Systems, ACM, Yokohama, Japan.



12/12/23

3:00–4:30 PM (ET)

# The Monarch: Tactile Access to Digital Learning

**ACVREP  
Credits**

Stephanie Walker  
Leslie Weilbacher  
Hunter Summerlin

Access  
Academy





# THANK YOU!

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