Teaching TOUCH

By Lois Harrell

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TEACHING TOUCH:

HELPING CHILDREN BECOME ACTIVE EXPLORERS OF TACTUAL MATERIALS

A GUIDE FOR TEACHERS AND PARENTS OF YOUNG VISUALLY IMPAIRED CHILDREN

By Lois Harrell

Teaching touch: Helping children become active explorers of tactual materials

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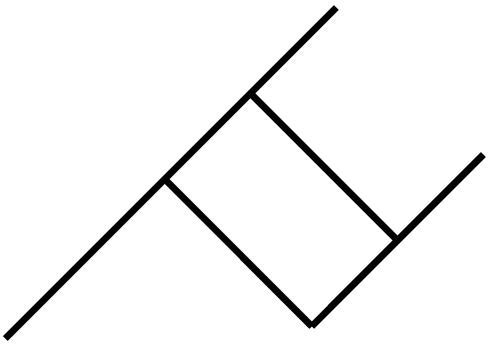
INTRODUCTION

A capable, blind five-year-old was asked to get the chair from a nearby room. After some time she returned without the chair, stating that there wasn't one. The teacher knew that another child had taken the chair into that room earlier. She went back with the girl, and noted that the chair was in the middle of the room. The child went right to it as she said, "But this is all that I found in the middle of the room." And the teacher said: "Yes, that's the chair. It's upside down. Let's turn it over and take it with us."



This was an important reminder that the perspective of the visually impaired child can

be fragmented until a solid foundation is established. Without sight to provide an instant total view and spatial information about the chair, the child needed to piece the tangible information together. However, she had only experienced chairs in the upright position. Gathering the information by touch from the features of the overturned chair did not produce a familiar image. In effect, the object in the middle of the room did not match with the child's idea of "chair-ness." She did not yet have the tools to generalize in the new situation.

The significance of the story for this guidebook is to emphasize that when providing materials for children whose visual input is different, we need to understand the total child. **This guidebook approaches the challenge of helping blind children read and enjoy tactile illustrations independently. The main emphasis, however, is on helping the child develop the skills to do this.** After all, interpreting pictures depends on being able to make sense of the representations. The child's perspective and motivation to piece together, decipher, understand and apply any tactile experience must be respected and addressed.

For example, tactile graphics and raised illustrations are often fun for the blind child to explore. However, you must be careful when using such materials as teaching tools to represent visual formats. The ability to interpret raised outlines by touch is a different process from using a visual memory to instantly decipher pictures. When a sighted person looks at a picture, not only is the image brought into the brain and interpreted quickly, but related comparative thoughts are activated. A snapshot of an old car would feed the mind with the image, size, color, brand, and style of car, and it might even activate related memories. Merely raising the outline of the car for the tactile learner would offer no base for association. To process that picture as a “car” by touch requires much more than feeling the tactile surface variations.

From the visually impaired child’s perspective, understanding what raised outlines represent involves more than looking with the hands and fingers. The blind child needs a well-established foundation to think in the abstract terms of pictures representing real objects and concepts.

You can help build a foundation for making mental associations out of the symbols and formats of tactile pictures. Introduction of the raised illustration should be paired with discussion about what it represents, to reduce the risk of frustration and guessing, which takes energy. In addition, the child needs organized tactile scanning skills.

BUILDING UP MENTAL IMAGES

The child needs to have some sort of a mental image of the real object before an abstract picture makes a connection. In order to generalize, a variety of active experiences are needed to generalize from. In actively providing the foundation, we must remember the sophisticated thought processes children need to visualize or "imagine" when vision is not providing the input.

Think about it with this simple exercise in "nose-ness":

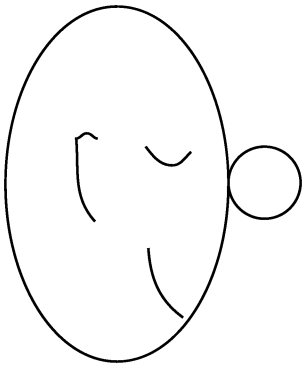
- Touch your nose with your fingertip. Where do you feel it? Most likely you feel it at your nose.

- Touch somebody else's nose with your fingertip. Where do you feel it? You feel the input through your finger.

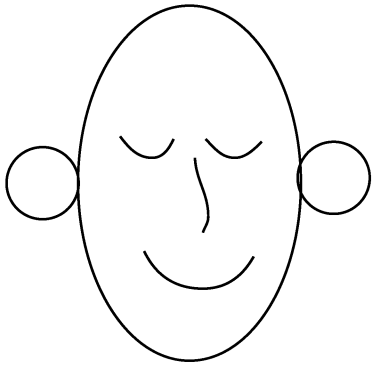
- Without pulling on visual memory, touch an unfamiliar doll's nose with your finger. What feedback did your finger provide? Generally you feel some sort of a bump–maybe a hard bump, maybe soft.

With lots of experiences like this, you have the language skills and experience so the word *nose* in the directions allows your mind to pull on an already established personal image of "nose-ness." In effect, you have observed enough faces to understand the label of nose, whether it is your *nose*, another's, or a doll's nose.

• Now go to a raised illustration with a nose, from the blind child's perspective:



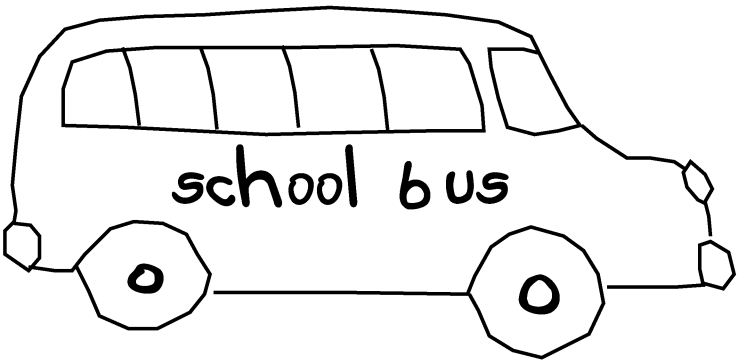
"I like to look at pictures with my hands, but why is the little circle called a 'nose'?"



"Why does this picture have two noses?"

Print illustrations, charts and graphs are used to enhance the sighted child's learning experience. A picture can reinforce the content of the text with one glance. In fact, a quick look at a picture may provide information that will help a new reader to work through unfamiliar words. For example, an image of a yellow school bus may be enough to help a child to identify the new word, *school*, through association. The picture of the school bus is abstract because it is not the real thing. However, the picture alone, no matter what size, is enough for the young mind to use the visual memory to recognize it.

One of the major drawbacks with the use of tactile graphics is the problem of scale. The sighted child, once familiar with a school bus, has no difficulty identifying one up close, seeing how big it is, seeing the wheels, the doors, the windows, the steps and so forth. That recognition also occurs when the bus is far away and tiny. A toy bus and a picture of a bus on a page, regardless of size, are also easily recognized.



Tactile graphics for the child who relies on touch can be useful as tools, to expand on and reinforce various works. However, when presenting tactile graphics to a blind child, we must be aware of the child's foundation for learning. Again, assess it from the blind child's perspective when the tactile school bus is just an embossed outline of a visual illustration. Think about it:

- At what point can the small pattern of raised lines be interpreted as a school bus when processed by touch alone? *"Help me see why this small square is supposed to be like the cold smooth surface that's the window in my bus."*

- What if that child's only experience with a bus is sitting in the seat, without a mental image of the body and wheels of the vehicle? *"What are wheels?" "Why do they 'go'?"*

- What associations between the real school bus and the model or picture will be processed by the child who uses touch to piece the information together? *"I ride to school in a bus. Why is the toy you gave me a school bus?"*

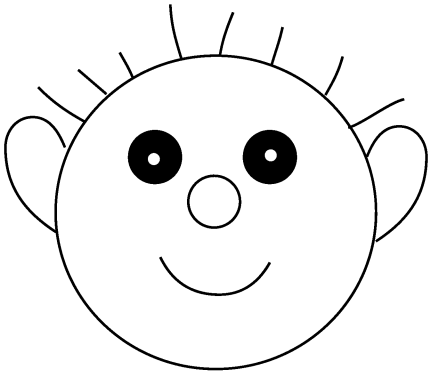
- How can we help the tactile learner develop efficient tactile scanning skills?
- How can we help the child put together the separate pieces of her experiences to make mental images of real things?
- How can we prepare that young mind to be able to form associations with replicas and raised illustrations?

"Help me to wake up my mind AND my hands."

INTENTIONAL TEACHING

Taking an active and early role in teaching the child can make a difference. For example, a young seven-year-old child born totally blind was given a new book (*Book About Me*) with simple line drawings of a face. After he read

the title, he quickly scanned the raised illustration and happily commented, *"Hey, there's my happy face!"*



He was not told that he would find a picture of a face. However, this child had a passion for reading braille, and for looking at tactile graphics to figure out and find specific things. *Exposure, Experience, Exploring,* and *Enthusiasm* introduced him to the fun of such formats. Let's look at it from the boy's perspective:

- *Exposure:* He was tactually and verbally introduced to real objects, braille and raised illustrations as a baby.
- *Experience:* Using his hands, guided within the context of shared activities that others were involved in (beyond books and cause-effect toys) was a natural part of his day.
- *Exploration:* As a toddler, when he was ready to be part of the action and do things on his

own, he was actively taught how to scan with his hands and fingers in an organized way, being cued to identify "landmarks" and gather useful information.

- *Enthusiasm:* When he became aware of consistencies and purpose to cues for learning, he delighted in proving himself right. When a child shows enthusiasm for learning, he no longer participates just to please his parents or teacher, but also to satisfy his own interest.

Note: This child's language skills contributed to his ability to share his observations and questions, providing the feedback not only to himself but to others.

Let's expand on the first three E's from the perspective of blind children in general (some excerpts are from *Children's Vision Concerns Looks Beyond the Eyes!* by Lois Harrell):

Exposure:

In order for a seriously visually impaired child to begin to recognize patterns of actions, events and things happening around him (so that anticipation can lead to participation), he must have *active involvement* (be part of the action) with others and with the environment.

Exposure brings awareness of existence of things, causes, and effects. It stimulates curiosity and the asking of questions. It activates the imagination. It feeds the mind with information and can be varied or consistent, random or sequenced, tangible or undefined. It is not necessarily determined by what the child will "readily understand," but rather by what is happening.

The benefit of exposure is that it contributes to a foundation for association. If, for example, the class is studying various kinds of trucks, has the child at least had enough exposure to fit together (associate) parts of the conversation? The concept of "truck-ness" will not come only by sitting in the cab of a pickup. Has the child explored the inside of a mail truck, or perceived the vastness of a moving van, or felt the big wheels of a logging truck? It takes lots of exposure for the "4 C's of Communication" to take root (*Compare, Categorize, Comprehend, and Communicate*).

For the baby, we need to keep in mind that random exposure to things may not provide enough tangible information to be processed meaningfully until the child has the experience and explorations to interpret. For example, a baby does not have an image of a spoon,

though she opens her mouth with the words, "Here comes the spoon." For the child even to put her hand on the spoon when it is brought to her mouth does not complete the image of "spoon-ness," though it does activate curiosity.

Experience:

Exposure is a vital part of experience, but it alone will not necessarily result in understanding and application of information. In order for the child to have a real foundation of experiences, she must personally understand things in ways that give her realistic associations. She needs to be able to process and interpret for meaning. Experience provides the opportunity for tying things together with understanding.

It is important to respect the process of learning, which goes from *concrete* to *manipulative* to *abstract*. For example, language is abstract and can be absolutely meaningless without real association. Use caution not to be misled into thinking that a child knows what he is talking about because his descriptive picture seems so complete!

> *I went to the home of a totally blind boy who was extremely verbal. He was eager*

to share the fact that they had gotten a kitten, and proceeded to describe it in detail. He proudly told me that it was his job to feed the kitten. I was thrilled for him. When I asked where it was, the father told me that it was outside and they wouldn't let it in because cats carried germs. In fact, the boy had never touched it. His sole "active" involvement was putting a bowl of food on the porch and calling the cat to dinner. The boy knew how to repeat such descriptions as pointy ears, long tail, and soft fur, but he had no real idea of what he was saying. He wouldn't have recognized a kitten from a stuffed animal.

Experience is more than words!

Exploration:

A spin-off of experience is the ability to independently explore with the intent of gathering information.

Three of the young boys invited to a birthday party were totally blind. One of the boys happened to be more assertive and curious. When something was placed in the center of the table, which happened

to be directly in front of this boy, he asked what it was. He perked up when he was told that it was the birthday cake, but he did not receive an answer when he asked what kind it was. So he very methodically checked out his space, noting where his cup was and then slowly extending his hand, occasionally scanning slightly to the left and right. Someone became aware that he was about to "look at the cake" with his fingers. Just as they yelled his name, the boy thrust his finger forward and scraped off some frosting. He quickly retracted his hand, and assumed a compliant posture. After a brief pause, he licked his finger, and then with a smile he turned to his buddies and was heard to say, "Hey guys, it's chocolate."

This brief scene reflects many of the attributes that contribute to successful exploration:

- **Listening skills:** The boy knew that some one brought something in and placed it in front of him.
- **Curiosity:** He wanted to know what kind of cake it was.
- **Language:** He had the communication skills to ask for information.

- **Motivation:** He was sparked and wanted to check out the flavor.
- **Foundation:** He knew that birthday cakes were whole before the Happy Birthday song, and that if he reached it he could sample the frosting.
- **Organization:** He mapped out his immediate space so that he wouldn't knock something over as he reached out.
- **Scanning techniques:** In addition to moving forward with his hand, he also incorporated a left-right sweep for greater efficiency.
- **Identification:** He identified the frosting as chocolate.
- **Social:** He shared the information with his friends who did not see the cake.

The ability to explore is a major asset for the tactual learner. It is complex, involving such things as spatial awareness, organized scanning skills, the ability to piece information together, tactual discrimination of identifying "landmarks," language skills to apply labels, and the ability to think comparatively about the object of focus and its relation to other objects. And above all of these is the influence of motivation.

Random exploration can provide lots of information for the mind to sift and sort. However, deliberate attention to helping the child learn to define, map and organize the immediate world builds efficiency and reduces frustration. Practice within the context of personal daily activities sets the foundation. For example, when the child has learned to get the cookie box from the shelf, and then scan the sides to locate the top in order to open it and take out a cookie to give to Mom, think of all of the wonderful concepts internalized within the purposeful activity–including self concept!

THE CHILD'S PERSPECTIVE

Children begin to learn as they become aware of the predictable qualities of their world through reinforced experiences. *"When I hear Mama's voice call my name, I know I am going to be picked up." "When I am put in the high chair, I know the food is coming!"* In fact, children seem to delight in discovering the consistencies of the *"Laws of their Universe"* as they build the foundation for thinking and forming associations. Finally comes the satisfaction of *"Yes, I was right!"*

Different ways of receiving input can influence the initial foundation for learning. The sighted

child merely opens his eyes to effortlessly receive a flood of information introducing and reinforcing awareness of those basic consistencies. And because vision is the main *integrating* sense, it can also tie together simultaneous input being experienced by the other senses of hearing, touching, smelling and tasting.

The child who does not have the organizing sense of vision has a more fragmented start. Until active experience gives her the tools to understand herself, others, and the world beyond reach, a blind child may not be able to form accurate associations. Learning goes from concrete (tangible and real objects that are effortlessly processed by sight) to manipulative (replicas and interactive things, such as toy cars) to abstract (words producing associations with real things and imitation of purposeful activities, like playing store). A baby is born in an abstract world that's initially lacking concrete associations. With vision, sight quickly fills the void. When the visual system does not provide this input, active involvement with others and intentional introduction to the world around is vital to the foundation for learning.

The blind child's mind must be nourished in a way that activates curiosity and motivation to

do comparative thinking about similarities and differences in the world. Yet before being able to think comparatively, the child must have a sense of consistencies that provide the basis for forming associations. In effect, the child needs lots of "hands on" experience with real things and activities in her daily life in order to form mental images in relation to labels.

A parent wanting the best education for her totally blind child was disappointed when the team determined that she was not ready for Kindergarten. The child was still in diapers, could not communicate, and couldn't independently do basic self-help skills. (Unfortunately, the child had been in a daycare situation that did not include her in functional activities.) The frustrated mother sarcastically demanded a one sentence statement that defined Kindergarten readiness.

She was surprised by the response: "Can she make a peanut butter sandwich?"

Look at the rich foundation of basic concepts provided when the child is actively introduced to the global picture of making a sandwich. The question, *"Can she make a peanut butter sandwich?,"* could be followed by a string of questions to understand the child's perspective.

- Does she know that a sandwich comes in parts? *Parts of the whole.*

When a child is given ready-made food, she may miss the parts that make the whole. What is the difference between a piece of cake and a sandwich? Has she taken the sandwich apart?

To make the sandwich:

- *Does she know where the sandwich items and tools are kept?* (memory for location) Has the child been part of the action of putting groceries away to know about them?

  - In-out of bag; on-under shelves; beside related items; open-shut drawers and cupboards; categorizing items (foods, healthcare, household); heavy-light of containers; top-bottom of shelves and items; warm-cold of items to be refrigerated or not; likes and differences of cans, boxes, bottles and containers; materials such as plastic, paper, cardboard. (All of this is experienced within the context of purposeful activity, setting the foundation for imitation play and abstract thinking.)

- Can she organize the steps in making the sandwich?

  - Locate the loaf of bread?...find the top?...open it?...and take out two pieces of bread? (counting)
  - Get the jars of peanut butter and jelly and twist open the tops?
  - Get the knife out of the silverware drawer? (sorting and discriminating between knives, forks and spoons)
  - Dip the knife in the peanut butter and know when some is on the blade? (spatial and weight awareness)
  - Spread it on the bread? (spatial awareness and fine motor handling of the knife) (Note: Sometimes practice spreading on frozen bread or even the back of the hand can promote awareness of the feel of the sliding knife.)
  - Put the two sides together? (matching)
  - Cut it in half? (spatial organization of fine motor)

- *Does she know that the ingredients come from the store?* (community awareness) Does she know how they get to the store? (transportation and job awareness) Active exploration of various delivery trucks can be fun and informative.

Making the sandwich offers immediate opportunity to build an awareness of basic concepts through actively doing. More importantly, it provides the foundation to wake up the mind and the hands to purposefully process information for later use. The long-term value of this kind of functional activity is that it may help the child develop tools to independently and successfully follow raised illustrations and tactile graphics, because it promotes abstract and conceptual thinking.

TEACHING THE TACTILE LEARNER

It is vital to respect that *learning is different when vision is different*. When we understand and address these differences, it can help us to reach and teach from the child's view. The purpose of the following sections is to promote awareness of the tactile learner's perspective.

THE BASIS OF LEARNING IS CONSISTENCY

The foundation for learning is based on the discovery of consistencies in the Laws of the Universe, which then apply in discovering more consistencies. When you hold a ball in your raised hand and release it, you know it will drop towards the ground. You can count on it. When you put something on the table, it stays there. If it floated up, you would look for a reason!

Vision instantly provides and reinforces awareness of consistencies. It organizes the world and ties together input being processed by the other senses. Even before the sighted baby can hold a bottle, he is motivated to turn to see it in Mom's hand as he hears her footsteps approach. And he sees when she leaves the room; it isn't "poof–she

disappeared.” Vision gives him the start of an awareness of *object permanence*.

Things are different when vision is not there to spark the mind to look for consistencies and to help organize the other senses. The visually impaired baby is in a fragmented world until active experience nourishes the mind and provides the tools for learning. When a toy is dropped, it is just gone. Sometimes it will be placed in the hands again. However, when you guide the baby’s hands in scanning to locate the object, it provides information about self, immediate space and that *object permanence*. In other words, active involvement, or being physically introduced to the movements to internalize information, is the key to gathering information without sight.

In effect, guiding the baby’s hands in an organized and logical way provides input that will activate curiosity and the desire to look for consistencies and to be part of the action. When you give descriptive words at the same time, you give the mind labels to pair with the actions and objects. This, in turn, provides more complete images for comparing things in a pragmatic or logical world.

GETTING A *REAL* START!

The foundation for learning starts with receiving and processing information related to reality so that productive thinking can take place. As told in the Introduction, learning goes from *concrete* (real objects), to *manipulative* (replicas), to *abstract* (symbolic representation):

Concrete:

Knowledge of actual things, purposeful cause-effect activities, and the "why" of interactions (social and physical) provides related mental images.

The visually impaired child must have deliberate involvement with actual objects before replicas will have any meaningful association. If you haven't actively shown the child an actual apple in a way to form associations, a plastic replica of an apple won't give any mental input related to the real thing. Even if it had a scratch and sniff sticker on it, true "apple-ness" would be lost. In effect, the child will be pulling on the adult's descriptive terms, rather than building a personal foundation for learning through actual processing of qualities. If the child has never had a chance to explore

the whole car inside and out, the word “car” means nothing more than sitting in the car seat. A toy car, then, is just an object with wheels to spin.

Manipulative:

After the child has enough of an image of “the real” to do *comparative thinking* about the identifying characteristics, replicas can start to have meaning. Once she has a foundation from having explored the real car, the child can see the wheels on a toy car as more than things just to spin. She recalls exploring the real car, compares the placement of tires on the toy, and may go on to look for other characteristics that relate.

We need to keep in mind that it is more difficult for the tactile learner when the associations are vague because they are designed to pull on visual imagery. For example, the blind child may see plastic farm animals as interesting hard things to manipulate. But identifying body parts of the animals involves rote memory of the label that was given in relation to exploring “landmarks” on the surface. The child may be able to identify the difference between the “ears” of the cows and those of the horses, but they are tactile

observations in relation to the *model* without any relationship to the *real animals*.

It is nice when the child is motivated and has keen scanning skills to compare and identify the toy animals, because it refines perceptual skills. However, even if the child lives on a farm with these animals, immediate association between the parts of the toys and the parts of the animals is evasive until representation of real things is understood.

For the sighted child, manipulating things such as stacking blocks is reinforced when he watches his mother stack the cans in the cupboard. However, when a visually impaired child stacks blocks, the purpose of the skill from the child's perspective is limited to the blocks alone. When you deliberately introduce a purpose for an activity, you can help the child's mind to extend the association. For example, stacking actual things, such as boxes of tissue or bars of soap, can provide a *functional* aspect to stacking.

Manipulating shapes to put in a form board introduces lots of skills for comparative thinking, including spatial awareness, and likes and differences. The sighted child, without actively thinking about it, reinforces the awareness of

the shapes while looking around the room (the round clock face, or the square pillow or the triangle at the top of the milk carton). The blind child deserves to be guided in discovering relationships between the form board shapes and things in the personal environment.

Abstract:

The ability to call up a mental image of something that is not readily present is the foundation for abstract thinking. It requires a memory of experiences that can be reviewed and sifted and sorted. It's that sifting and sorting that sets the foundation for thinking comparatively.

Use of language involves the ability to think in the abstract. Language is more than knowing a lot of words. It involves real associations. It has been said that there is a connection between language and play because both involve abstract thought processes. Early play is based on imitation, which can be elusive to the blind child.

To imitate, one must understand "the real." Playing house with dolls requires understanding the roles and interactions of people in actual life. Likewise, being familiar with the community comes before building a town of

blocks and “driving” toy cars from place to place.

Look for ways to build on the visually impaired child’s store of experiences and turn them into pretend play. The foundation of mental imagery is the core to meaningful language. Learning also progresses in time from abstract thinking with words to being able to relate to symbolic representations of those words in braille and raised illustrations.

LANGUAGE IS BASED ON FOUNDATION, FEATURES, AND FUNCTION

Foundation:

Active involvement with others while they go about their business will give a child a foundation of *motor knowledge* connected with words. This does not mean you have to give “hands on” guidance and laboriously point out identifiers for every single thing in the child’s world. But with repeated opportunities, the child who is included in daily experiences at a natural pace, and within the context of real activities, will start to tie together the sequences and associations.

For example, think of all of the rich opportunities to interact with objects when the baby is put *in* the grocery basket as items are placed in it, too. The child learns to expect interaction with a variety of items, within a defined space. (This is valuable because anticipation leads to participation.) When you repeat the name with each new item, the child begins listening for consistency.

Naturally, you'll put the baby in the seat when the basket gets crowded. But the active involvement can continue as you present items (with their names) while the baby rotates around to drop them in the basket. This kind of involvement also reinforces object permanence since the child already knows about the basket from experience. You can also use related descriptors, such as *heavy, cold, box, carton,* etc. so the child gets extra information in the context of the purposeful activity.

You can extend this foundation at home by placing the grocery bag near the child as you empty it. Let the child "help" by holding some of the items; this helps him remember and learn more about the items in the context of the involvement. It also completes the process that was begun at the store. The idea is to activate curiosity and start random comparative

thinking about the items and the process. And remember: It all begins with the child's physical interaction with the objects.

As stated before, mental imagery and comparative thinking help with language and the foundation for reading. The sighted child is continuously exposed to written words and pictures. First books are not necessarily for the child to identify details in the pictures; rather they are to activate an interest in doing comparative looking for fun. The words are not for them to identify, but they present a casual introduction to patterns that have some sort of meaning.

The tactile learner deserves a similar opportunity to encounter pre-reading input within the context of daily activities:

- Early and repeated opportunities to explore braille and raised illustrations even before they can have meaning introduces them as a natural experience. The intent is not for the child to identify words or letters, but rather to have fun identifying "braille-ness."
- Braille labels of things around the house offer opportunities for reinforcement. The child is told the label and shown where to find it.

- Braille/print books introduce the use and organization of books–how they are laid out, how the pages turn, etc.
- Raised illustrations, though not yet meaningful, help the child learn to look with the hands for consistencies on pages.

In effect, as the child becomes aware of braille and tactile illustrations the foundation is being set for later use.

Features:

Awareness of characteristics or features of things helps the child form associations and identify things predictably. For example, prongs are the primary feature of a fork, when compared with a spoon. To be able to identify them, then, the tactile learner's experience with the fork and spoon must be more than just holding the handle and bringing it to the mouth. Learning to look for *defining features* is necessary.

"But wait a minute, how come the prongs on a comb are called teeth?" Yes, this is the kind of comparative thinking that needs to take place! A question like this one gives you and the child a great opportunity to compare the features of teeth in the mouth with teeth on a comb, and

build on the mental images of likeness and differences.

Random exploration provides lots of information for the child. However, intentional teaching on your part can help the child learn organized scanning skills to look for and piece together features.

Note: There is a misconception that a high percentage of blind children are tactually resistant, and will not accept hand-over-hand guidance. Most children do not like being forced to do something that they are unsure of, especially when physical constraints are used, such as having the hands controlled for a period of time. Naturally, if the resistance is intense, it is counterproductive to disregard the child's message. However, there are ways to respect the child's message while actively introducing things. Helping the child to reduce the focus on *"What is happening to me?"* and drawing attention to the act of processing for information can reduce resistance. The ultimate goal is to *wake up the hands*!

- First, a more natural flow of any co-acted movement is enhanced by sitting behind the child to guide tactual exploration of something. When you are facing the child,

you are more likely to use movement that is comfortable for you but not for the child. For example, in helping the child to bring food from the bowl to the mouth, when facing towards the child, you'll generally bring the spoon straight up to the mouth. If, however, you do this from behind, or facing the same direction as the child, the movement of scooping toward the body and then going up is more comfortable for the child.

Likewise, in teaching techniques for organized tactile scanning, hand-over-hand guidance is more invasive when it comes from the front. With the co-acted input, the palms of your hands may cover the child's fingers, which can inhibit free movement. However, when the guidance is from behind, your fingers can have a lighter contact while gently cueing the child's fingers.

- Second, you can have greater success if you draw the child's attention to the purpose of looking with the hands, so that the focus won't be on resisting. By giving descriptions of the brief interaction you will share, and then giving cues for short and predictable times that you will be in the child's space, you make resistance unnecessary.

For example, when introducing a shoe, announce *"We're going to look at the shoe. It's on the floor in front of you."* The child will anticipate the touch. Then, while you guide the child in reaching, along with reinforcing words such as *"The shoe is in front,"* the child will have anticipated the movement. Then pick up the shoe quickly, accompanied by a quick count of *"1 - 2 - 3."* Immediately on "3" the hand-over-hand interaction stops. With repetition, the child will learn that it is the count of three, rather than resistance, that stops the "hands-on." This draws the attention outward.

- Third, when the child recognizes that active guidance is predictable and provides useful information, the sequence of the processing will determine when it is over and counting will no longer be necessary. By providing the related verbal input in the first person, you invite the child to process from a personal perspective. *"I hold the apple, find the stem, and then around to the bottom."* The focus is now on "What information am I getting and applying?"

- Fourth, with the pattern understood, the child will be ready to learn *tactual processing with closure*. This means scanning for

information about the features of an object in an organized way.

Cue the process with a gentle touch on the fingers to note the starting point, then continue the cueing with a verbal descriptor when the fingers cross a "landmark," and then come around again to the starting point: *"This is the toe of my shoe; I trace along the bottom to the heel, and up into the hole where my foot goes, then down over the straps on the top to the toe."*

As the child learns to use the hands and fingers to purposefully look for details that relate to verbal descriptors, the joy of learning will drive the motivation to explore. The ability to do comparative thinking will be based on actual personal experience, and this paves the way for the child to learn and interpret things independently.

Function:

Comparing the *features* of an object to the *function* of an object is the key to forming real associations, along with the ability to generalize. For example, what makes an orange a fruit rather than a ball? It is eaten. What are the functions of the prongs on the

fork and the “bowl” of the spoon? Function is what provides the “-ness” definer of the label, tying the associations together in a way that allows the mind to generalize in new situations. What associations does the child have with “cup”? But if the child’s cup has two handles, why is Dad’s thing with one handle called a cup? Or what about the Styrofoam cup from the gas station? You drink out of them all. But what about a glass? The goal is to provide a memory bank of experiences that can be tapped into with such questions.

Active involvement with the function of things is significant in getting the foundation for association. When you guide the child in processing the features of the toothpaste tube, and show how to take off the top to squeeze out the toothpaste, it gives purpose to many aspects of that one act. When you co-act with the baby in processing the food jar, identifying the top, and opening it, the “pop” sound is connected, and the function of the top “on” and “off” has associations. When the food is scooped from the jar to the bowl in a way that the toddler can be part of the action, purpose for the related sounds can be processed. Active versus passive processing enhances learning! The child has personal motivation to participate!

Something that is often overlooked with the blind child is the relationship of purpose with activities. The child may take blocks in and out of a can, but the experience is often confined to the immediate activity. The skills must be extended to *real* activities. Has the child been guided in scanning the features of the box of crackers, opening it, reaching in, and taking out two crackers and putting them in a bowl or container... “one for me and one for you”?

In effect the child must understand the purpose of the act as well as how to perform it. A key for this foundation is in letting the child be part of the action whenever possible. It takes energy, and the question: “What could my child be actively experiencing with me while I am doing this activity?” Give your child the opportunity for *contextual processing*, or learning within the context of real activities. Thinking in terms of function gives a foundation for being a “doer” rather than a “done-to.” It has been said that no learning experience is of any more value than its real application to a person’s life. Without sight, your child may not realize the purpose of an activity beyond the immediate experience. It is important to show the child how the same skills can be applied in different situations.

Awareness of consistencies,
Refined tactile scanning skills, and
The ability to generalize–

these compose the **ART** of reading braille and tactile graphics. Their uses will be understood through purposeful active experience.

4 C's for Communication: Compare, Categorize, Comprehend, Communicate

Awareness of the features and functions of objects and activities provides a basis for language. Thinking with words, in turn, paves the way for communication, which involves exchange with others.

Communication is both *receptive ("I receive and interpret what others say.")* and *expressive ("I express my thoughts to others.")* Both aspects can include words, gestures, and actions. In fact, visual gestures and actions often reinforce the meaning for the sighted recipient. Without such subtle hints, the non-visual child needs and deserves extensive intentional teaching in situations that expand the 4 C's for Communication:

Compare:

Comparative thinking involves all aspects of the child's life–gross motor, fine motor, smell, taste, thermal, spatial, emotional, etc. Words associated with any input give the child's mind abstract images to sift and sort. Vision provides information through observation. Without quality vision, when the mind does not have memories of experiences to compare and expand on, words can be tricky.

A young boy experiencing his first Blind Olympics was ready for the rope run. It consisted of two parallel ropes with plastic tubes to slide along as he ran the twenty feet from start to finish. The child had never actually run before, so he slowly moved forward toward his mother who was calling to him at the end. When someone yelled at him to start running, he responded that he already was. The reply came, "No, go faster," so the child started moving his feet rapidly up and down, but he was not propelling forward.

He knew the concept of fast, but did not associate running with covering space. He knew about water running, and "running out

of milk," but he hadn't personally experienced, nor observed, moving outward.

Deliberate attention to comparing likes and differences is important; so is attention to comparing different meanings of the same word! Maybe the mother practiced moving quickly while holding her son's hand, or moved his legs forward in larger strides to help him feel his balance shift from one leg to the other. She knew, in any case, that he needed to feel in his own body the difference between a steady walk and an energized run. With that foundation, the concept of water "running" could also begin to make more sense.

Categorize:

A "turned-on" mind works to build a memory bank of associations. In effect, categorizing pulls on many attributes, including both features and function. Think about it with this string of words: golf ball, baseball, tennis ball, orange. The last word surprises us because we were lulled into the "ball" category by the first three items. The related feature is actually *roundness.* And, again: beach ball, soccer ball, basketball, football, puck. Oops, instead of the feature of roundness, *function* was the key.

Categorizing enhances the ability to do comparative thinking, and it also broadens the foundation for communicating.

T. presented the challenge of many young blind children who don't talk purposefully. His communication skills were extremely frustrating because the family heard sporadic clear words, and in school he did not talk at all. At 3 1/2 he was scheduled for glaucoma surgery, and the family was told not to feed him on the morning they were to bring him to the hospital. An emergency occurred, and the doctor had to schedule the surgery for later in the morning, so they stayed home to wait.

Though T. was hungry, food and drink did not come. He slowly said, "Drink... juice... cookie," and then a string of words followed. Suddenly the mother realized he was not only talking, but the words were all in the same category. She followed him with a notepad and copied over 30 "food words," ranging from common items like cereal and peanut butter sandwich to such things as broccoli, pizza, and casserole. He had a purpose to talk! The mother's joy at his success was frustrated by her inability to produce the food.

Comprehend:

Hunger motivated the child to express his needs. He also had enough of a grasp on language to think comparatively and say words related to food. In effect, he was aware of "food-ness." Then he tapped into a cubbyhole in his brain that stored food information and labels. The vast array of food words and the quickness with which he said them showed that he understood there was a connection!

Communicate:

Obviously communication depends heavily on the ability to do comparative thinking, which is a major tool for making connections. But the motivation to be "part of the action" of purposeful sharing is complex. Receptive and expressive communication depends on more than the foundation discussed so far. The perception of the value and power of words is important. Communication has value and power if the words serve a purpose and have an effect.

Blind children are often talked to. But think about their role in the exchange: A child may hear "Do you want a drink?" and then a cup is placed in front of him. No wonder, when he is

thirsty, he repeats the phrase. He has been taught that "Do you want a drink?" is related to getting the drink. He was also taught that questions don't need to be answered. This is reinforced when he hears "Dad, do you want a drink?" He did not see the father gesture "yes" with a nod of the head, so he did not get the picture of the power of communication. However, when Dad responds "Yes, I want a drink," and the child is part of the process of giving it to him, the value of the exchange is modeled.

Abstract thinking depends on this knowledge base of words and their application. This in turn gives a basis for use of braille and raised pictures, which, after all, are tactile representations related to mental images.

PRACTICE MAKES PROFICIENT

For the tactile learner the term "practice makes proficient" is especially significant. Learning goes from cortical (*"I need to think about it"*) to *sub-cortical* (*"I do it automatically"*). With reading, it is said that the child needs to see the words at least 100 times before easily recognizing them. Likewise writing braille, studying a tactile picture, or playing the piano,

takes practice, practice, practice before the fingering is automatic, without breaking the flow.

Repetition, especially in a variety of situations, is a key to learning. For example, when a sighted child first learns to zip her jacket, she has had a visual preview of the experience by observing others zip jackets, pants and purses, and is eager to copy. Then, after being part of the action of zipping a jacket, every time she sees someone else zipping something open or closed provides a review. In fact, just looking at classmates with zippers on their jackets is a reminder of the process. The blind child needs "hands on" repetition to get enough reinforcement of the movements to make them automatic. Having the child tactually following your hands as you zip your own jacket, and actively noting zippers on other people's jackets, also expands the association. But it's the repeated personal application that's crucial.

Getting daily life skills into "automatic" is extremely important. Focused attention can only be on one thing at a time. If, for example, the child still needs to concentrate when put-ting on a coat, it can be at the expense of thinking about other things. The teacher may be giving instructions to the whole class as

they get ready to go out, but the child may miss the message entirely when attention is directed at the coat. And if quality vision doesn't fill in the missing information as the class moves on, the child will be at a disadvantage. However, if the child has had enough opportunity to become proficient in such common activities, she'll be able to use the skills automatically while processing other information at the same time.

Give your child lots of chances to practice the everyday routines of living, even when it would be simpler, or quicker, or less messy for you to do them. Help her succeed so the repeated practice becomes rewarding. The goal is to hear the child say, *"I want to do it myself!"*

Sometimes practice leads to *preparation* rather than to proficiency, which is equally important. For example, early introduction to Orientation & Mobility, or cane travel, is not to teach the small child to walk to the store independently. But, as the cane becomes a familiar tool, some of the basics of its use become automatic, which makes it easier when the child needs to get around in school, or walk to the store, sometime later on.

Similarly, the child who is introduced to braille and raised illustrations at an early age can practice scanning these things even before they have meaning. The familiarity that comes with repeated exposure prepares the child to focus on the fingertips later when the pictures or the braille need to be decoded.

The tactile sheets that accompany this booklet give your child lots of ways to practice *tracking* (following a line from one point to another) and *scanning* (searching a page, first to get an idea of what's on it, and then to find a particular item).

If you delay introducing tools such as these until school age, the newness of the tools will take the child's concentration away from adapting to school and acquiring academic skills. A foundation of "automatic" skills makes a big difference!

SEQUENCE OF DOING

Becoming a "doer" rather than a "done-to" may not come easily to the child who is missing visual invitations to interact with the world and other people. When eating means opening the mouth to have a spoon of food enter, how does the child get an idea of the

total procedure, from preparation to palate? How will the child learn to dress independently if his only experience with the process is extending an arm or leg to have clothes slipped on by someone else? In other words, how can we replace the *"Good Fairy Syndrome" ("When I wait here, things just magically happen for me!")* with the desire to be part of the action? The challenge is compounded when a family does not have high expectations for the child's future independence, or doesn't know how to cultivate the child's concept of being an individual.

Active attention to the Sequence of Doing can make a difference: *Aware, Can, How, and Do*.

Aware:

Our lives are filled with activities that we carry out automatically without even thinking of the organized sequencing that is involved. For example, when we sit down to eat we may serve ourselves and then pick up a utensil to get the food, while continuing a conversation and filtering out background noise. We reach deliberately for our glass. We also eat pretty much at the same pace with everyone else, finishing at about the same time. Essentially,

practice and application of the related skills has dimmed our awareness of all that is involved.

From the child's perspective, when eating, what has he experienced beyond opening his mouth and being fed? Has the food been prepared on his tray so he can compare and process related sounds and smells? Is he aware that your hands reaching in the box cause the noise related to the cookie being taken out and put in his hand? Has he given you a bite of his cookie? Being an active part of the scene promotes thinking about all the little parts involved.

When you introduce tactile pictures and braille to the child, make sure he is aware of where and how they were made. After all, these things will not always "magically appear" before him! Let him practice punching dots or raised lines with a stylus and paper, or drawing on *Quick-Draw Paper*, so he becomes aware of the skills involved even before he gets any meaning from what's on the page.

Just as hands are not the same as eyes, so touching is not the same as seeing. But for a blind child, touching takes on more importance as a way to find out about the world. Once you've made your child aware that there is a

world out there to be touched, let him be free to touch it! The child's hands should be actively reaching and exploring away from his body, even when there is a risk of bumping someone or knocking something over.

Too often we interrupt a child's search or exploration by telling him what we see or warning him what he's about to touch. You can watch the child's body closing back in and the active processing stop when this happens. Obviously there is a place for being helpful, such as when the child is searching in vain for something just out of reach, or when reaching out may result in real danger. But if your child always has the feeling of being served, watched, and warned, he will not find the motivation to reach out to the world as an active learner.

Can:

In addition to becoming aware of the steps within various activities, the child also needs a personal role. When the mind processes from the perspective of active (actual involvement) versus *passive* (observing), the anticipation of doing (*"I can do this"*) motivates interest.

When getting dressed, if the child hears “Take off your shoe” as she is guided in slipping it from her foot, the words will start to make sense with the action. Then with time, if there is a pause after the request, she may initially wait to be guided, but then do it on her own, because she is *aware* that she *can*. Likewise, with the tactile sheets in this program, as you gradually decrease the verbal prompting, look for the child to realize that she can continue the exercises on her own.

How:

When helping the child move from being a done-to to being a doer, we need to assess and address the related steps within each activity. By organizing the process from beginning to end, we help the child to mentally review the sequence with completeness or “closure.” But first the child needs to be aware of the related tools, their features and their functions. For example, with eating: flat plate holds food, and spoon with handle to grip brings food to mouth. Then, by giving initial guidance through the process of scooping the food, taking a bite and returning the spoon to the plate, and by providing accompanying words in the first person *("I get my spoon. I scoop. I bring it to my mouth. I put the spoon back.”)*, we give

the child additional input to personally review the experience. Often a child will bring a cup to the mouth and then drop it because the total process is not familiar.

When introducing a new task, explain the process and purpose. Repetition and review of the experience will make the child familiar with the steps.

Rather than taking a long time to introduce each phase, keep the pace of your hands-on guidance within a normal time frame–this promotes later efficiency. When the child is practicing on her own, she can take the necessary time for success. Yes, we need to respect that it takes time for the tactile learner to process, without visual confirmation and feedback from the experience. However, if you get bogged down with the details, you'll *teach* the child to go slowly!

> *Two boys in a neighborhood school were totally blind. One had played with coins when he was little, and liked sorting them according to denomination. He could quickly identify them by characteristics that he had noted, including size, weight and tactile land-marks, and he was proud when he was allowed to buy something by himself. The*

other tactile learner was not introduced to money until he was in school. He was shown that the outside of the dime and the quarter had ridges and the penny and nickel had smooth edges. He was then given the task to compare the sizes of the coins and then to scan around the edges and sort them. The repeated lesson had no time limit and no incentive to hurry. In effect, he learned to go around and around and around each coin because that was how he was taught.

In the cashier's lines of the school cafeteria, which of the two boys did the classmates avoid getting in line behind?

Parents and teachers with limited knowledge of braille often feel uneasy with it because it seems so difficult. Remember, though, that the goal for the blind learner is to recognize braille or other tactile symbols as easily as sighted people read print. Help the child to move her hands efficiently and with confidence over braille and tactile pictures and not to "scrub" at them bit by bit. She may not understand the details at a young age, but she will be learning to take in the "whole" of the page in an active way.

The older and closer to school age the child grows, the more you'll want to build specific learning objectives into her time spent with tactile pictures. The Appendix at the end of this booklet includes more ideas for training the mind and hands to use tactile graphics.

Do:

A young blind girl was skilled at using the braillewriter but did not like the act of reading braille. She frequently expressed her mental block with the phrase, "I hate braille." She associated it with a task to please her parents or her teachers; she found no pleasure in it for herself. Her new teacher sat down to write out some braille exercises for her.

"Oops," said the teacher, "I goofed that letter up. You'll see what I mean when I give it to you." The girl's attention perked up. "Oops, there's another goof," said the teacher. She went on writing, making occasional mistakes in her braille and making a related sigh with each one. When the teacher handed over the exercises, the girl took great interest in reading them carefully. She quickly scanned for the mistakes and delighted in finding each one. But more

importantly, she discovered that she could go faster when she had a purpose!

The goal is for the child to know how to do things, to be aware of the "why" of getting things done, and to *initiate* doing. However, motivation is missing for children who've learned to depend on others to define their space and prompt their involvement. The act of being a doer requires taking responsibility for learning and applying skills.

The teacher in the story above found a way to spark the girl's interest in reading. The method may have been unusual, but the girl's interest was genuine once she had her own motivation to read. The teacher expressed her *expectations* for the student, and she found a way to tap into the girl's *enthusiasm* to make learning more fun. The next step would be to spark the child's interest in the *application* of braille.

When a sighted child asks *"Why do I need to go out and get the mail, when I would rather sit here and listen to music?"* it reflects defiance. The same could be true with a blind child. However, with the blind child the statement could also be an indication that the

child does not think of himself as a contributing member of the family.

Sometimes the value of being a doer needs to be taught. It is more than pleasing others. The spark must ignite a desire to please oneself!

APPENDIX

*(This appendix contains material adapted from the **Tactile Graphics Guidebook** by John Barth, ©1981 American Printing House for the Blind, and updated product references.)*

INTRODUCING BLIND STUDENTS TO READING TACTILE MAPS

This section provides a framework for introducing students with little or no useful vision to the reading of tactile maps. It gives basic information to initiate instruction for blind students who have no previous experience in reading tactile maps. The primary problems, concepts, and skills necessary for tactile map reading will be discussed.

Orientation to Environment

Any map is an abstract representation of a real environment. Before blind students can use maps that represent environments with which they have had no direct experience, they must learn that maps can represent their own personal environments. When blind children enter school, they often have an inadequate knowledge of their environments, the objects

in them, and the spatial concepts necessary for understanding the physical relationships between objects and people.

Introducing blind students to tactile maps before they have sufficient comprehension of their environments often results in confusion and lack of motivation to use the maps. The teacher's first task is to *orient students to their environments.* This should include detailed physical examination of the school, particularly the classroom.

There are three important aspects to orienting students to their environments.

First, the students needs to be able to identify objects in the environment by name (example: desk, shelves, windows, closets, door) and examine them in a systematic way with their hands.

Second, the students need to learn a set of basic concepts and terms that will enable them to describe their environments. One set of concepts relates to the description of the physical relationships between objects, using terms such as far, near, next to, on top of, under, beside, left, right, between, etc. One commonly used tool is *Tactile Treasures*,

published by the American Printing House for the Blind. This set contains thermoformed items and a booklet of questions related to concepts commonly found in preschool and primary grade instructional materials. It helps show which concepts students have mastered and which ones they need more active practice with, and it allows students to explore and demonstrate understanding of the basic concepts on a page format. Another helpful kit, *Map Study I*, helps students make a connection between the big room around them and a small diagram of the room as shown in a tactile map.

Third, orientation pertains to the students' ability to get about in the immediate environment. It's essential to train blind students to navigate from one location to another. For example, blind students should be able to travel independently from any point in the classroom to any other point in the classroom. Blind students should also be able to travel from the classroom to significant locations in other parts of the school building, such as the bathroom, exits in the building, and water fountains.

Basic Tactual Skills

Research and observation of blind children examining tangible objects and tactile displays indicate that they have serious gaps in their tactual perceptual skills. There are several specific actions that can help remedy this situation.

- When a tactile display is first presented to blind students, they should *define the size and extent of the display* by tracing the perimeter of the display with both hands.
- They should then be taught to *examine the display in a systematic way* in order to completely cover the display and get a sense of it. One recommended way is to have students search the display from top to bottom using two hands. Both hands are placed side by side in the upper left-hand corner and moved down the display toward the body. When the hands reach the bottom of the display, they return to the top, slightly to the right of the original starting position. Both hands then move to the bottom again, searching the next section of the display. The process of searching down the map, then up and to the right, is repeated until the entire display has been examined.

- Most tactile displays use raised lines to represent various physical and political features. It is important that blind readers be able to *trace a line* with a great deal of skill. Despite the seeming simplicity of this task, many blind students have difficulty with this basic skill. One effective procedure for tracing is to use the index fingers of both hands. The lead index finger follows the line and determines the direction it is going. The other finger serves as a reference, trailing behind and maintaining contact with the line. Thus, if the student loses his place with the lead finger or becomes confused by other symbols near the line, he can return his lead finger to the reference finger and proceed from there.
- In examining any tangible object or tactile display, it is important for the student to *analyze* the materials by observing *distinctive features* and integrating them into a whole. For example, in learning the shapes of the United States the student should note the features that distinguish one state from another. One of the prominent features of the state of Oklahoma is the “panhandle.” Systematic tracing of the state might lead a student to describe the shape as a “rectangle with a handle in its upper left-hand corner.”

Many states or countries can be characterized by their distinctive features this way. However, some may not lend themselves as easily to this method, and other memory aids can be used, such as overall size and closeness to other states or countries. Once a student has learned the distinctive features of a shape, he can locate and identify the shape by remembering and *searching for two or three distinctive features*. It's important that students examine and remember shapes on the basis of distinctive features rather than attempting to look for the whole shape.

- In examining raised line shapes, students should choose one feature as a *reference point* so that, as the index fingers trace around the shape, they will know where they began and when they have made one complete tracing of the shape.

The concepts and skills described above could be introduced by using simple geometric forms embossed on a braille page or on a thermoform sheet. The students could then practice *systematic searching, line tracing, distinctive features analysis, and locating reference points*.

THREE-DIMENSIONAL OBJECTS ON A TWO-DIMENSIONAL SURFACE

An important point for understanding and using maps is for the student to realize *that real objects can be presented abstractly on a two-dimensional surface*. One way to approach this topic is to use real objects and represent them on a tactile display in raised form. For example, solid wooden shapes (triangle, square, circle) can be presented simultaneously with raised line shapes. The student's task would be to relate the solid object to its raised line image.

A second step, for older students who have some braille and spelling ability, would show that real objects can be represented by symbols on a display. For example, a doghouse could be represented by the letter D in braille or raised line capital letter, a tree by a letter T, etc. It is also important to use common objects such as spoons, bottle caps, or scissors, which can be represented in the same way either with a tactile picture or with a letter or braille symbol for each.

After the student has acquired the idea that *objects* can be represented abstractly on a tactile display, the next step is to show that the

spatial relationships between objects can be represented on a tactile display. To accomplish this, the teacher should place three small objects on a desk, in a column spaced about two inches (five cm.) apart. The spatial relationships between the objects can then be described by the teacher while the student examines them with his hands. For example, if a spoon, a bottle cap, and a coin were placed next to one another in a vertical column on a table, the spoon could be described as being above the bottle cap and the coin below the bottle cap. The objects should be rearranged several times so that the student will use a variety of terms to describe different relationships, such as left, right, far, near, between, next to, etc.

Once the student is able to describe the spatial relationships between physical objects, the next step is to show these relationships and their tactile images at the same time. The teacher can present the student a series of three objects, at the same time showing the tactile display which uses the first letters of the names of the objects as symbols. The teacher can then substitute point symbols for the first letter of the name so the student will begin to become familiar with the use of a different symbol system. The student can then be asked

to describe the relationship between the objects while pointing to the symbols on the display. The objects and their corresponding symbols can be arranged in a variety of ways to provide the student with practice in describing relationships.

THE STUDENT'S FIRST MAP

At this point the student should be ready for his first map. This first map should represent an environment the student is familiar with, such as the classroom. It would be wise at this point to give the student another guided "tactual" tour of the classroom. The map should represent desks and other furniture in the classroom with geometric shapes such as squares, rectangles, and circles or with point symbols. It is important that this initial map be kept as uncluttered as possible. It may also be good to provide a key for students to practice with.

The student should first learn the shape and name that each symbol represents by referring to the key and participating with the teacher in a tactual tour of the map and describing what is found. It's important that the tactual skills mentioned earlier be taught here; namely, a systematic exploration of the map from top to

bottom, the tracing of the lines of the shapes with the two index fingers, and a distinctive features analysis of the shapes and symbols.

After the student has examined the map and is able to name and describe the spatial relationships between the symbols, three types of tasks can be introduced:

1. The student can be taken to a specific piece of furniture in the room and then asked to locate it on the map. For example, the student can be taken to the teacher's desk and then asked to point to it on the map.
2. The student can be shown a specific symbol on the map and then physically locate it in the room. For example, the teacher could point to the symbol on the map representing the clothes closet (without naming it), and ask the child to identify it and go to it.

   Once the students are able to identify all symbols on the map and locate them in the room, they should be asked to suggest a few additional symbols to be added to the map. For instance, the teacher could label each student's desk on the map with the first letter of each student's name in braille or raised line capital letter. Again, the student should locate both the new symbols

on the map and the corresponding objects in the room.

3. The students should be introduced to the concept of routes (that is, how to travel from one point in the classroom to another). Students should physically perform the task first and then show the teacher with their fingers on the map how they navigated from one location to the next. Also, the teacher can trace from one symbol on the map to another and then ask the students to physically navigate that route in the classroom.

In performing these tasks the student should be asked to say the relative positions of symbols on the map and objects in the room. For example, *"When I'm sitting at my desk, the door to the classroom is toward the front of the room on the right side opposite the teacher's desk."* This will enable the student to learn to give directions as well as understand directions.

Expanding the Map

Once the students have demonstrated their understanding of the initial map, it can be expanded to include the hallways and floor

plan of the building near the students' classroom. Again, features such bathrooms, exits, water fountains, and main offices should be shown at the beginning. The same process should be followed: giving the students a tactual tour of the hallways, followed by a tactual tour of the tactile map, naming the significant features on the map, and completing the navigation tasks. More details can be added to the map at the students' suggestions.

Maps can be made of other areas of the school, such as the playground, cafeteria, dormitories, etc. However, a thorough tour and detailed examination of the environment should come before the introduction of any map. It is important not to assume that students are familiar with the area just because they appear to be competent in doing certain tasks within it. For example, just because the blind student is able to enter the dining hall, find a seat, and eat, does not mean that the student has a concept of the objects and physical characteristics of the whole room.

Only after students have had lots of practice with maps that represent their own environment can the teacher begin to introduce maps of other environments they have never physically experienced.

Summary and Conclusions

Primary problems, concepts, and skills necessary for reading tactile maps have been discussed and include the following:

1. Orientation to personal environments
2. Identification of objects and their physical relationships
3. Geographical concepts
4. Defining the extent of the map
5. Systematic search
6. Line tracing
7. Analyzing distinctive features
8. Searching for distinctive features
9. Reference points
10. Tangible images of 3-D objects on a 2-D surface
11. Tangible images of spatial relationships
12. Use of symbols
13. Student's first map
14. Routes
15. Expanding the first map

The teacher may note that many of the concepts and skills necessary for reading tactile maps are important for reading other types of tactile displays such as graphs and diagrams.