Tangible Symbol Systems Primer

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This primer provides basic information, tips from the field and troubleshooting suggestions about the use of tangible symbol systems. Complete information is available in products described at the end of this primer.

Contents

What are Tangible Symbols?

Tangible symbols are objects or pictures that stand for or represent something about which we need to communicate. Tangible symbols may be:

- whole objects
- parts of objects
- associated objects
- textures or shapes
- line drawings
- photographs

These different types of symbols illustrate progressively more abstract levels of representation.

What Makes Symbols Tangible?

There are several properties that make symbols tangible:

- They are permanent; that is, they exist in a permanent display and don't have to be recalled from memory.
- They may be manipulated by both the user and the communication partner.
- The relationship between symbol and referent is obvious to the individual user, since it is based on the user's own experience.
- Three-dimensional symbols are useful for people without sight, since they are tactually discriminable.

Who Needs Tangible Symbols?

People who might benefit from using tangible symbols are individuals who lack the skills to communicate clearly using speech or other abstract symbol systems such as sign language. People who have learned to use tangible

symbol systems include individuals of all ages who experience the following disabilities:

- severe intellectual disability
- developmental disabilities
- autism or pervasive developmental disorders
- severe vision impairment
- severe orthopedic impairment
- multiple disabilities
- deaf-blindness

Although we do not believe that there are any prerequisites to communication intervention, we do believe that there is a logical sequence of intervention. Our research (Rowland & Schweigert, 2000) has shown that individuals who already communicate pre-symbolically (using gestures or vocalizations) will more readily learn how to use tangible symbols.

If an individual does not use pre-symbolic behaviors intentionally and reliably to convey basic needs and preferences, then you should begin by teaching him or her to do so.

Bridging Function of Tangible Symbols

Learning to use tangible symbols may lay the foundation for the later acquisition of more abstract symbol systems. Here are some examples:

- Adam, who has vision and hearing impairments, initially used three-dimensional symbols. Later, he progressed to using two-dimensional symbols.

- Sarah used to have sight and had learned to use picture symbols. When she lost her sight, she quickly switched to using three-dimensional symbols, made from parts of familiar objects. Later she began using thermoformed symbols, which are thin, plastic impressions of her original symbols that are very portable. These are more abstract, since they carry less information.

- Catherine's speech was not developing as expected, but she quickly learned to express herself using picture symbols. As her confidence developed, she began speaking, especially in conjunction with her use of the picture symbols. Eventually Catherine learned to use speech without the support of tangible symbols.

- Gina had a long history of using manual signs in an imitative fashion, but without apparent meaning. After she had become a competent communicator using tangible symbols, she began to use manual signs in a more meaningful fashion.

- Alberto, who had a diagnosis of autism, had usable vision but was very dependent on tactile information. He would use his fingers and mouth before experimenting with anything. A tangible symbol system was created for him which combined three-dimensional and two-dimensional information in each symbol. His system of photos with small three-dimensional elements attached allowed him to request things he desired throughout his day. Later on Alberto began to develop speech, but he still needed his tangible symbol system. As we encouraged him to use his speech more, his need for tangible symbols declined. Eventually, he began to use speech as his primary means of communication.

Recent Research Results

Tangible symbols have proved useful for a wide variety of individuals of all ages. Tangible symbol systems is not just a mode of communication, but a systematic instructional sequence. A recent study (Rowland & Schweigert, 2000) demonstrated the following findings:

- Tangible symbols may serve as a bridge to other symbol systems, including abstract symbol systems such as speech or manual sign language.
- Learning to use tangible symbols does not interfere with the acquisition of speech.
- Tangible symbols may be a useful means of communication for some children with autism spectrum disorders.
- Individuals who are already able to communicate effectively using gestures or vocalizations are more readily able to learn to use tangible symbols than are those who do not have intentional pre-symbolic communication skills.

Basic Strategies

Where to Begin?

Once you have determined that an individual understands how to communicate pre-symbolically, you will need to answer three questions before you begin teaching the use of tangible symbols:

What is the most motivating context in which to start instruction?

Tangible Symbol Systems describes an instructional approach that begins with the use of symbols to request something that is desired. If a person has no interest in a particular context or activity, it is unlikely that she will want to communicate about it. Highly motivating contexts and materials should be used that also occur regularly and frequently enough to provide the user with plenty of practice with this new communication system. Obviously, not all communication deals with requesting what one wants, nor can all

situations be motivating all of the time. However, to start an individual on the road toward symbolic communication, it's important that there be strong motivation to communicate.

What type of symbol is appropriate?

Always start with the level of representation that the individual can understand now. Later you can move on to more abstract levels of representation.

What behavior will the individual use to select a symbol?

This depends on the learner's fine motor skills and visual abilities, as well as the learner's ability to elicit another's attention. She might select a symbol by pointing to it or touching it, or by handing it to her partner. The behavior should be clear to the partner and easy for the user to produce.

Constructing Tangible Symbols

Tangible Symbols should be constructed for each individual user, capitalizing on the features of the referents that are most meaningful to him or her. If the symbol does not have a connection to the referent that is clear to the user, then it is not tangible to him. For that reason, tangible symbols are not pre-made and marketed. If you used ready-made symbols, you'd have to assume that the symbol set includes ones that represent items that are motivating to your particular learner, and also that the relationship between each symbol and its referent is obvious to your learner. Both of these assumptions are unlikely.

Three-dimensional Symbols

Three-dimensional symbols may be identical objects, parts of objects or associated objects (such as a straw for "drink"). Suppose you're deciding how to make a 3-dimensional symbol for a particular toy that a child highly prefers. Pay attention to how the child plays with it. What does he focus

on? Does he hold the toy by the handle? Does he pull the string or push down on the lever to activate it? Is he focused on the red arrow that spins?

By making a symbol that is similar to the features of the toy that the child focuses on, you create a symbol that is immediately meaningful to him. For instance, a pull string from a broken See 'n Say might be a good symbol for that toy if the child independently uses the string himself. Or a handle bar grip might make a good symbol for a bicycle. Note: miniature objects are rarely useful symbols, especially for people with poor vision.

Two-three Dimensional Combinations Symbols

For some individuals it may be necessary to combine two levels of representation. For example, a child with some usable vision might be quite reliant on tactile information and tend not to use her vision. In this case we might combine a photo image with a 3-dimensional representation of it on the same card. This increases her exposure to 2-dimensional representations, but maintains her access to a symbol type that she readily understands. The photo is placed at the top of the card so that when she tactually scans the 3-dimensional portion the photo is not obscured. Over time, we could reduce the tactile information provided by the 3-dimensional portion of the symbols as much as possible.

Photographs

When taking photos for symbol use, it's worthwhile to attend to the amount of background "information" that you include. For some people, a picture of the referent in the context it's associated with is a meaningful symbol. For another person, the background should be a solid neutral color, contrasting in color to the referent pictured. Colored photographs may provide lots of useful information to some users, while others will respond better to black and white images.

Specific Line Drawings

These 2-dimensional representations are line drawings of referents. They are specific, meaning that they look exactly like the actual referent used, rather than a generic version of it. The drawing of the toy car looks just like

the user's favorite toy car, not just any old car. Photographs may be traced and then photocopied onto regular paper and sized to accommodate the user. They may be colored like the referent.

Generic Line Drawings

These are the 2-dimensional images available through commercial sources. For those who can use this level of representation meaningfully, it's easy to keep up with their growing vocabulary. Pictures may be photocopied or printed off the computer using specially designed software. These images are generic because in most instances they do not look identical to the actual referent. With the exception of color that you may add, the car picture may not be very similar to the user's actual car.

Monitoring Instruction

Comprehension Checks

When communicating verbally, it is a simple task to check the user's comprehension of a new symbol. We can easily ask "Do you understand me?" and the answer can be "yes" or "no". It is not as easy to determine whether an individual really understands the meaning of a tangible symbol, since she cannot talk about it. Therefore, we always build a comprehension check into the communication routine for every new symbol. Essentially, a comprehension check means that each time the learner uses a tangible symbol, he or she must also indicate the corresponding referent.

The comprehension check is included every time the new symbol is used until acquisition criteria have been met. We do not use a "What you touch is what you get" approach, since this may result in a failure to understand the referential meaning of symbols.

Strategies for conducting comprehension checks are explained in detail in the Tangible Symbol Systems instructional materials. Comprehension checks should be eliminated as soon as possible so that the learner is allowed to use tangible symbols without an elaborate routine, just like we use words.

Promoting Progress

The ability to communicate is a constantly developing skill. One key to promoting steady progress is to regularly document the learner's performance using objective data. Whenever the evidence shows that the learner has reached a learning plateau, variables should be adjusted to ensure continued progress. There are seven major changes that may promote progress when learning to use tangible symbols.

- The first and most important change is to **expand the learner's vocabulary**. As soon as the child has acquired one set of symbols, introduce more. Give the user the power to communicate symbolically about as many topics as possible.

- Another step in targeting progress is to **increase the size of the array of symbols**. Generally a learner starts out using only one symbol at a time. Using a single symbol requires no discrimination, but does teach the learner what to do with a symbol. Upon the addition of a second symbol to the array, the learner begins to discriminate between two symbols. Gradually increase the number of symbols available to the learner in the symbol array. The more vocabulary presented to the learner at once, the more efficiently he will be able to communicate.

- Once a learner understands how to use a set of symbols under carefully controlled conditions, show her that the symbols can be used in other settings; such as at home, in the community, with other people, and at other times of the day. Make sure that the use of symbols **generalizes to any appropriate context**.

- Once the fundamentals of communicating through tangible symbols have been acquired, encourage the learner to use symbols for **different communicative functions**. Generally learners start by using symbols to make requests or to make choices of items that they enjoy. Once learners have become adept at making requests, show them how to use symbols for other communicative purposes, such as labeling or making comments or asking questions.

- Another approach to increasing the complexity of symbol use is to progress from single-symbol utterances to **multi-symbol utterances**. It is

possible to chain tangible symbols together into simple phrases, just as it is possible to chain words together.

- Tangible symbols must be available whenever they might be needed. Accessible symbols are more likely to be used by the learner. If a learner does not have constant access to her symbols, she will not be able to communicate at will. Unfortunately, some symbols may be large or difficult to carry from site to site. Once a learner has understood how to use one type of symbol, think about how to **make the symbols more portable** by making them smaller, lighter, or placing them in a permanent array such as a book that can be easily carried.

- The final area of targeting progress involves changing to a more **conventional type of symbol**. Although it is more critical to teach a learner to communicate competently and spontaneously with a large vocabulary, teaching the use of more abstract symbols is one method of continuing progress.

Helpful Hints

Tips from the Field

This section contains ideas about using tangible symbol systems contributed by parents and professionals. If you would like to contribute new ideas, please email your information to design@ohsu.edu. Try to be clear and concise. You may attach pictures. Please also indicate whether you give permission to include your name. We will try to include your new ideas as we update this primer.

from Pam Harris, parent

"My son Josh has used a variety of communication supports in the pool, at the beach, in the tub and shower.

1. Using a t-shirt transfer, iron a communication board onto a white tank top and wear it in the pool.

2. Double laminate a communication board and using either plumber's glue or aquarium glue, affix the board on a kickboard or other appropriate flotation piece, or to a styrofoam tray.

3. Print out a communication board, roll it and insert it into a clean, empty and dry 2 liter soda pop bottle. Cap securely.
4. We have used the double laminate, water proof glue and affixed communication boards onto the very inexpensive garden kneel pads, too. They are so lightweight, have a handle, and float too.
5. We have recently visited some wave pools where kickboards and other pool toys are not allowed. Luckily, I wear a communication t-shirt so this was not a problem.

from Erica Mbangamoh, MS, CCC-SLP

"I have a family who needs to make EVERYTHING visual for their daughter. It will all be low-tech, and mom owns Boardmaker but I'm helping supply the ideas. Here's what I've been able to tell her so far:

1. Placemat
2. Pillowcase
3. Kickboard (for swimming, extra lamination, etc.)
4. Garden kneeling pad even for in the house while playing
5. Refrigerator magnets for foods/kitchen vocal

from Cynthia C. Millican, PhD, CCC-SLP

"When teaching AAC graduate level...one of my students designed a topic board to support communication pertaining to swimming/pool activities on

a kickboard. The key is strong lamination! I think you could also design smaller topic-related choices/communication needs and have them laminated in a 3-5 mil laminate - and then put them on a ring/key chain fob. That could be worked into a knot on a floatation device."

"Use magnets on the fridge for requesting things in the fridge. I've also had parents put a strip outside the pantry with snack choices. The symbols for all the possible choices are kept on velcro strips inside. Placemats at the table for dinner conversation and requests. Task strips for guiding household routines for dressing, toothbrushing, getting ready for school. A symbol area by the door to let the child know if it's a school day (bus) or not (home symbol). Symbols to represent desired TV shows. Special toys kept in special places, where requests were needed to access them."

"I used the cabinet strategy at work - similar to the strategy for representing the foods in cabinets. I had all kinds of materials inside my cabinet and put 2 long velcro strips with all the symbols representing the items inside the door. I would then provide a "visual schedule" of the activities we would be doing. I loved it one day when one of my students got out of his chair, opened the door, scanned the symbols on the inside of the door (all the actual objects were right there on the shelves!), picked what he wanted and gave it to me! How cool! He opted for the symbolic request versus taking what he wanted off the shelf!"

from Marcia Sterner, MS, CCC-SLP

"Since there are lots of swimming pools in Florida we have developed the "Florida Manual Communication Board." This consists of a kneeling pad (for gardeners) which is lightweight, usually has a handle, and it floats! You can sometimes find them at the dollar store or a hardware store. We create a communication board, laminate it well, and attach with adhesive back Velcro to the kneeling pad. You could also use clear packing tape to make it sturdier. This concept works well for those kiddos that like to throw things too!"

"I develop a lot of quick starts for devices and have developed a set of what I call Assistive Technology Lifesaver Cards. They are brightly colored half sheets of paper with tips and tricks on topics such as BoardMaker,

implementation ideas, use of visual supports, etc. Let me know what kinds of things you're looking for."

from Joel Glassman

"We have an indoor pool and required the 2 individuals who needed communication to use the doughnut flotation device around the waist to which we double laminated picsyms. For free swimmers, we created a communication corner they had to swim to in order to bring back a block with a symbol on it. We later let the blocks flow in the water but had to color coordinate them according to the topic of what they wanted. The "boogey boards" work well though some did not want to use them. Using picsyms in the locker room proved less of a challenge."

Troubleshooting

Below are some common issues that arise in teaching someone to use tangible symbols, with suggestions for resolving them.

It is difficult to tell what interests my child.

Conduct a preference probe to determine objects or activities the child truly enjoys. Present many different pairs of items and record which items are chosen most often. Your data can help you to decide the relative preference for one item over others, and whether that interest is sustained or fleeting once the novelty has worn off. Your data may also reveal whether a position bias exists (always choosing the item on one side or the other), as well as providing valuable information about the child's methods of responding.

I need to set up some motivating opportunities for this individual to communicate, but she doesn't make clear choices.

Typically we can figure out what items someone really prefers by presenting lots of different choices and seeing which she chooses most often. However, not everyone will make clear choices of objects or activities initially. In such cases we may look to reinstatement behaviors (requests for more) to help us determine preferences, instead of choice

making. For example, the partner may initiate interaction with an object, then pause and look for a signal to start it up again. This can go on repeatedly until the learner indicates "no more" (by protesting or ignoring the partner), at which point the partner may introduce another item or activity. By tracking the number of reinstatements per item or activity, a list of preferred items can be generated. As she becomes more familiar with the individual items and corresponding interactions, the learner will have more information upon which to base her choice. This is particularly true for individuals with visual impairments. Merely touching an unfamiliar object may not provide enough information about it or the interaction associated with it. This connection may have to be built over time with repeated experiences.

My child really doesn't care much about toys, but she loves to interact with people. It's hard to come up with symbols for these interactions.

In this instance, it would be worthwhile to begin to introduce different objects with the various interactive games the child enjoys. The focus continues to be on the social interaction, but the object mediates the game and can come to be associated with it. For example, pattycake could be played with a hand puppet. Eventually when presented with the puppet, the child will associate it with the game. It will be easy to come up with a symbol for the hand puppet that can be used to request a game of pattycake.

How do I get started? Why would he want to interact with me?

Assessment information doesn't provide any real detail about an individual's personality, which is so important to interaction. Get to know the learner through observation and interactions before you try to teach him. This is time well spent. The individual must have the expectation that you are responsive. Building a relationship of responsiveness and reciprocity motivates him to interact and communicate with you.

The learner appears to be losing interest in the activity; he's more distracted and less careful in his responding.

In this instance it may be useful to evaluate preferences again. In many cases we will conduct ongoing preference probes for new interests, materials, and potential vocabulary so that when enthusiasm begins to drop off, we are prepared to reignite the routine with new materials.

My assessments indicate that the learner can understand more abstract levels of representation, such as line drawings, yet when she is presented with these symbols she does not act on them.

Sometimes the chosen symbols do not elicit the desired response. The learner may stare at them, but she does not act on them in any way that is readily apparent to the communication partner. In this instance we may begin with less abstract symbols, such as three-dimensional ones, simply because this level of representation elicits a more obvious response. For example, the learner sees part of an object, recognizes it and reaches to touch it or pick it up. This behavior can be shaped to the desired indicating response, such as giving the symbol. Once the process of acting on symbols—any kind of symbols--is established, then more abstract types of symbols can be introduced.

My child doesn't have a consistent way to gain his partner's attention (such as vocalizing, tapping the partner, or activating a switch) prior to selecting a symbol.

In this case, you may decide to require the child to pick up and give you the symbol for the item or activity he wants. By using this response he is *both* engaging your attention *and* stating his request.

My student is physically unable to manipulate the symbols, but I can read his subtle eye pointing.

When eye gaze or eye pointing is the only available way to choose symbols, you must determine whether it is an accurate and reliable response. For example, you might collect data that shows consistent selection of preferred items from arrays of preferred and non-preferred

items using eye gaze. Once you are sure the visual behavior is reliable, then define it in specific terms. Describe the nature and duration of the visual fixation on the chosen object or symbol, as well as the procedures for presenting material and symbol choices. Make others aware of the procedure so that they can use it in a consistent manner.

My child appears to be picking randomly from the array of symbols, without really attending to them.

Obviously it is important that the child be aware of what his choices are before actually making a selection, either through visual scanning of the array (for those with sight) or through tactile scanning (for those with visual impairments). Fair enough. What about the child who has vision but who does not use his vision when making a choice? In such a situation, we may use the tactile scan as well, physically assisting him to touch each option in the array before allowing him to make the selection. We have found that the tactual input will often help to direct a learner's visual attention to the items or symbols.

The materials I need for my communication programs need to be used by the learner at other times of the day.

That's great! Ideally, the communication expectations will be the same at other times of the day, too! In other words, access to those specific items is always contingent on using the tangible symbols used in your communication porgrams. It can be confusing to the individual if he can get them at other times of the day without using symbols to ask for them.

I have a number of vocabulary options for communication instruction, but how do I prioritize them?

Aside from considering the motivating aspect of materials, it is important to select materials that involve an obvious need to interact with another person. This makes it obvious to the user why she must communicate to you. For example, a toy that a child plays with in a solitary fashion may not be as good for teaching new communication skills as would a toy or activity that she simply *has* to have help to engage with (such as putting a train track together, bouncing on a large ball, or climbing up the slide). The more

intrinsic the need to communicate is to the materials and routine, the greater is the likelihood that communication will occur.

The learner can use her symbols to make requests, but she only uses them if I approach her and ask her what she wants.

You're afraid that this child won't get the chance to communicate as much as she would like. The individual who knows how to communicate but does not initiate communication is left to the mercy of others to decide when communication will occur. She is too easy to ignore. It is extremely important that you arrange the environment to encourage this learner to initiate communicative exchanges. She may do this by vocalizing, tapping someone, or using a calling device to gain another person's attention. Having gained the attention of a communication partner, she can then make her request. Once she is consistently initiating communication, she should be encouraged to be persistent. To encourage persistence, don't respond to her first effort to attract your attention every time. You want the learner to become adamant (as well as appropriate) in her demands for attention.

My child often gets upset during instruction, even though it's obvious he wants the toys.

It is necessary to match what we say with what we actually do, from the child's perspective. Remember, the child is most likely reading our actions more clearly than our words or intentions at this point. For example, when conducting a comprehension check, the partner may say "What do you want?" while showing an array of desirable items. The child touches or grasps one object and the partner promptly removes the items before presenting a symbol array. Now the child is expected to select the corresponding symbol. Instead, the child becomes upset; guess why? The partner asked him what he wanted; he told the partner, and then the partner promptly removed all the items from his visual or tactile field, including the one he chose. He becomes flabbergasted, and confused. To avoid this confusion, try the following approach. Once the child has indicated his choice, acknowledge it by leaving the chosen item in his visual or tactile field. Present your symbol array with the chosen item still present, and have the child indicate the corresponding symbol. Then he may have

the desired item. The continued presence of the desired object may avoid confusion and distress while he selects the associated symbol.

The learner's performance varies from day to day, or even from person to person.

You cannot teach an individual to be consistent if you are not consistent yourself. The learner cannot develop expectancies about communicating if other people in the environment are not reliable and predictable in their own behavior. "But the social environment is known for its inconsistencies", you say. Yes, and that is why some individuals struggle, become frustrated, and quit trying to engage and control their social world through communication.

Imagine the same routine occurring in two different situations with two different partners each day. With partner A, the individual must always select and give the correct symbol in order to make a request. With partner B, the individual is allowed to simply touch the correct symbol, but may also be reinforced for touching the wrong symbol first or both symbols in the array at the same time. The net result is utter chaos. The individual is so confused as to what to do that he is now consistently slapping both symbols each time and sometimes he's reinforced and sometimes he's not. No clear expectation exists, his performance drops off, and the routine falls apart. If you suspect that this sort of inconsistency is occurring, analyze the routine, identify the inconsistencies and correct them. Once the individual recognizes a consistent routine, he will learn what is expected of him, and will respond accordingly.

I don't feel that you have time to collect data and I don't think it's really all that necessary anyway.

Data collection is a necessary part of instruction. How else can you document change, analyze performance, adjust instruction and objectively speak to the child's abilities? "George is having problems" doesn't tell you very much. "George makes errors during the last two or three opportunities in this routine every day" does. With that information you can respond. For instance, you might ask if he's losing interest in the routine towards the end. Maybe a "Finished" symbol or another tangible and acceptable way to

say "I'm done with this" can be introduced and the data may show that his performance improves.

Consider some other scenarios. Tricia is not acquiring the symbol for the toy dog. Looking at her data, we may see that every time the dog symbol appears in the same array with the puppet symbol, she chooses the puppet symbol, even though she has just indicated that she wants the dog from the array of toys. Looking at the two symbols, it becomes obvious that the symbols for these two toys are very similar tactually. Making them more tactually distinctive may clear up the problem. In Jack's case, the data indicate that he is only choosing the correct symbol on every other opportunity. This suggests that he is learning and re-learning the meaning of the symbols each time from the correction procedures. If his performance doesn't improve within the next two days and show that he is catching on and retaining the meaning of the symbols, then we need to back up and modify this obviously difficult step.
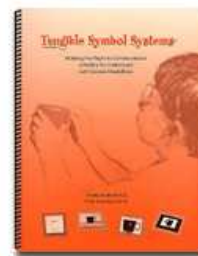
Most individuals who require tangible symbols will require a thoughtful, systematic approach to instruction. You will need to be perfectly clear how you plan to bring someone into the world of symbolic communication. Under what conditions (such as positioning, partners, etc), will he respond? What does the response look like and can others detect it? What kind of symbol is best? What vocabulary will you target initially? How many symbols will you include in the array? How long does it take him to acquire new vocabulary? The answers to these and other critical questions can be found through meaningful data collection and analysis.

Instructional Materials on Tangible Symbol Systems

(available through www.designtolearn.com)

Book and DVD

The Tangible Symbol Systems instructional materials include a 55-page illustrated manual and a 75-minute DVD. These products describe and illustrate alternative communication options and instructional strategies for a broad range of learners of all ages who are unable to communicate using speech, manual sign language, or other systems that involve abstract symbols. The field-tested materials are the result of extensive longitudinal research involving individuals with cognitive impairment, sensory impairment, autism, pervasive developmental disorders, and multiple disabilities. The DVD illustrates the instructional process and presents detailed case studies of five children, showing how they learned to use tangible symbols to communicate.

Online Courses

Tangible Symbol Systems: 7-unit online course. This course provides detailed instruction on the use of tangible symbols. The coursework is liberally illustrated with slide shows, photographs and video clips of children using tangible symbols in daily routines in public school classrooms and homes. Students will learn how to develop tangible symbol systems; how to assess an individual's readiness to use tangible symbols; how to implement instructional strategies; and how to monitor student performance and adjust instructional strategies to promote progress.

 Visit www.designtolearn.com for information about the products described above.