DOLLAR STORE THERAPY: PROMOTING MOTOR LEARNING AND SKILL ACQUISITION ON THE CHEAP

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OBJECTIVES

• Participants will
• Identify several basic postulates of current motor development and motor learning theories
• Review various seminal and current journal articles to provide supporting evidence for proposed strategies to promote motor learning and skill acquisition in the developing child
• Review the evidence related regarding the role and magnitude of practice, or time on task, required to promote skill acquisition.
• Review two task analysis models Ecological Task Analysis and Gentile’s Taxonomy of Tasks from seminal motor learning theories
• Implement two intervention strategies based on these models (Ecological Task Analysis and Gentile’s taxonomy of tasks) to modify and adapt activities to augment practice and maximize skill acquisition.
• Identify how to incorporate various items that can be purchased at Dollar stores to support these strategies.
• Develop treatment protocols/strategies to support motor learning in the home or clinic setting using these Dollar store items.
RE- Evolution of a Therapist

How my perspectives and interventions have changed over the course of my career.
I was a product of the 1980’s Early days as an NDT therapist--frustration!!!

Powerful treatment but with limited results.
II STEP compendium
TADA!!

Maybe we can do better.
Led me to study motor learning and motor control theory first as continuing education and then more formally in my PhD. A chance to study outside my field and to read more from a movement perspective rather than one that focuses on pathology. Very enlightening!!!
Ann Gentile -
Guided movement grid – if you didn’t plan it you can’t repeat it – hands off!

<table>
<thead>
<tr>
<th>Decision making process</th>
<th>Did I move As Planned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>successful</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>successful</td>
</tr>
<tr>
<td>Did I accomplish The goal?</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>surprise!</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>something’s wrong</td>
</tr>
<tr>
<td></td>
<td>everything’s wrong</td>
</tr>
</tbody>
</table>
The traditional educational and therapeutic approach of examining a person's performance of a specified movement pattern relative to a "normal" developmental sequence may provide some useful information, but is limited because the specified pattern may not be efficient for the particular person in the particular (Burton and Davis 1990)
TASK ANALYSIS
Task analysis - traditionally focused only on the task or activity and has not accounted for variations in the environment in which the task is performed, or variations in performer attribute.----- Prescriptive and rigid

Dynamic systems theory views task as the interaction of the performer, environment and task. ---- Evolving and in flux
As an example: Getting up from the floor traditionally taught using half kneel strategy

Ann Van Sant (1988) based on observation of adults, identified 17 strategies used to get up off the floor.

Identify how environment and performer attributes might impact strategies for getting up from the floor.
FIRST INTRODUCTION TO “USE OF TASK” TO GUIDE INTERVENTION.
Ann Gentile’s taxonomy of tasks (1987) 16 different categories of movement. – lead to my thought process to grade the activity within a given task.

Change components to add or tamp down the complexity and components of the task movement vs stability, object manipulation vs no object manipulation.

Opened up a lot more possibilities with interventions.
Taxonomy of Tasks

**Gentile’s Taxonomy of Motor Tasks**

Developed by Ann Gentile and her colleagues the taxonomy allows us to classify tasks according to four characteristics: inter-trial variability, environmental conditions, body transport and object manipulation.

- The task may be consistent (closed) or vary from trial to trial (open)
- The task may involve body transport or body stability
- The task may involve object manipulation or no manipulation
- The environment may be stationary or in motion
- Motion may be constant or variable
The Taxonomy of Motor Tasks

The taxonomy provides a window into what the clients perceive within themselves, within the environment, and within the task. It gives you a framework to systematically vary the environment, the task, and the requirements from the client to assess where problems arise.

You can use the taxonomy to set goals, plan treatments and scale activities to increase or decrease complexity. Using the taxonomy will give you an organized way to provide variety, and address “real life” scenarios.

With tasks where the patient is moving through space in a vehicle you need to consider whether the motion is being directed by the patient or if the patient is being moved through space. If the patient is directing the motion then the task involves the same level of processing as a task that involves body transport.

Assignment: Write in a task that fits in each category. Choose tasks that relate to real world skills and activities that would be important to your clients.
<table>
<thead>
<tr>
<th>Condition</th>
<th>Body Stability</th>
<th>Body Stability</th>
<th>Body Transport</th>
<th>Body Transport</th>
</tr>
</thead>
<tbody>
<tr>
<td>No motion in environment</td>
<td>No object</td>
<td>Object</td>
<td>No object</td>
<td>Object</td>
</tr>
<tr>
<td>No intertrial variability</td>
<td>manipulation</td>
<td>manipulation</td>
<td>manipulation</td>
<td>manipulation</td>
</tr>
<tr>
<td>No motion in Environment</td>
<td>No object</td>
<td>Object</td>
<td>No object</td>
<td>Object</td>
</tr>
<tr>
<td>Environment in motion</td>
<td>manipulation</td>
<td>manipulation</td>
<td>manipulation</td>
<td>manipulation</td>
</tr>
<tr>
<td>No intertrial variability</td>
<td>manipulation</td>
<td>manipulation</td>
<td>manipulation</td>
<td>manipulation</td>
</tr>
<tr>
<td>Environment in motion with intertrial variability</td>
<td>manipulation</td>
<td>manipulation</td>
<td>manipulation</td>
<td>manipulation</td>
</tr>
</tbody>
</table>
Ecological task analysis (ETA),

Originally presented by Davis and Burton in 1991, is perhaps the most detailed and comprehensive model which applies dynamical systems and related theories to the assessment and intervention of movement development.
movement form is described as a function of the interaction between performer attributes, environmental context, and the intended task goal.

ETA - is based on the premise that are many possible solutions to a particular task, and these solutions are determined by the unique interaction of performer and environmental constraints with the goal or intent of the action.
The separation of the movement solution from the task allows for any variation in movement from a *standard* or modal pattern to be, not a problem to be corrected, but a window into the dynamics of a person-action system.

Consider again the task of rising from the floor...
Observations of the degree of success in completing a task (movement product) and the stability and change in movement form (movement process) as performer and environmental constraints are systematically manipulated provides at least two important pieces of information.

First, the specific contexts are identified in which a person can **always** accomplish the task, **sometimes** accomplish the task, and **never** accomplish the task.

Second, the performer or environmental variables which elicit change in movement form may indicate what performer-environment systems or subsystems may be limiting the person to certain movement forms which in turn may limit movement product.
Ecological task analysis is comprised of four steps (Burton and Davis 1991):

1. establishing task goals by structuring the physical and social environments;

2. allowing choices of movement solution

3. manipulating performer, environmental, or task variables

4. providing instruction
Basic Postulates of Motor Learning – Short and Sweet Summary …

**Most important predictor of skill – time on task** need massive repetition!!

Most of the kids I work with are weak! Need lots of repetition to strengthen

Embed what you want the child to do into the task

Fine motor activities tend to be more interesting than gross motor generally can lead to more repetition

Refrain from so much guided movement or verbal instruction build on what the child can do but also take them beyond their current skill level

Novel tasks allow you to see how the child problem solves the task

Provide novel problems for them to solve – try to allow them to solve it on their own rather than demonstrate the solution this gives you a window into their perceived stability and dynamics

Look for flexibility and adaptability- components of a healthy nervous system
Most important predictor of skill – time on task need massive repetition!!

Learning to walk (Adolph et al 2012)

Many of the kids I work with are weak! Need lots of repetition to strengthen and increase success. (Damino 2006)

Embed what you want the child to do into the task

Beat the drum -- van der Weel, et al. found that the nine children with hemiparesis had significantly greater range of motion during a concrete "banging the drum" task than when simply asked to extend the arm as much as possible. But for the 12 nursery-school children without disabilities, there was no difference (van der Weel et al. 1991)

Reach as far as you can -- Leont'ev and Zaporozhets (1960) found patients with joint or peripheral-nerve injury, which restricted movement of the elbow or shoulder, could raise their arms progressively higher from condition (1) reach as far as possible with eyes shut, to (2) reach as far as possible with eyes open, with the arm seen against a ruled screen, to (3) reach up to a designated point on the screen, and highest in (4) reach to grasp an object.

Run as fast as you can -- children with Down Syndrome ran their fastest when the barriers they had to jump over were the highest.
Novel tasks

Provide novel problems for them to solve – try to allow them to solve it on their own rather than demonstrate the solution. This gives you a window into their perceived stability and dynamics.

Novel task allow you to see how the child solves the problem for themselves.
Fine motor activities tend to be more interesting than gross motor and generally can lead to more repetition (Protsman, unpublished)

Embed gross motor activities into the fine motor activities – activate more of the nervous system

Beads, beads, beads!

Stack em up
Refrain from so much guided movement or verbal instruction, build on what the child can do but also…. take them beyond their current skill level

Grading the movement-- Adding or decreasing the complexity
Using the 16 categories Ann Gentile’s taxonomy - Mobility versus stability, object manipulation,

Other ways to manipulate the task

Adding in a timed component

Adding an accuracy component

Dual Tasks

Linking movements with anticipatory control and functional purpose.
Look for flexibility and adaptability - components of a healthy nervous system

W sitting - ultimate controversy
Build in developmentally appropriate cognitive and play activities see handout
Play with a purpose.

The more the toy does, the less the child does!!
Equipment options- look at what activities you can imagine given various objects.

Takes shopping to a whole new level!

Imagine what you can do with it.
Tools to facilitate mobility

Pool noodles -- endless options
  balance (mat)
  bat
  crawl through, step through,

Kneeling pads- lily pads, steps of varying heights

Easter eggs – hunting, colors (matching sorting, labeling) carry on a spoon, put them together

Beads, beads beads- wonderful two handed activities. hang them on hooks or chair backs, put them on, reach for them, put them away in containers, walk between them lines or circles, pick them up from the floor
Tools to facilitate mobility

Laundry baskets

Boxes climbing in, building towers knocking them down
Balls of all kinds,

Ball on a string hit it with a pool noodle, suspend to get free standing,

Half ball – great for learning to kick can make one out of a tupperware bowl weighted as needed

Heavy, light, small, large, mushy – give them practice with variety

String paired with pool noodles, chip clips, beads facilitates reaching and movement.

Cones, use as targets, goals carrying balls as balance activity
Fine motor paired with gross motor

Tongs or salad forks -- pickup cotton balls, counting blocks, eggs,

Bug catcher- pick up smaller items much like scissors

Containers clear and opaque – kids love containers can be adapted for smaller hands
Encouraging use of Two hands –

Beads beads beads beads
Slinkys,
opening containers,
placing bands on bottles,
salad tongs,
chip clips on clothing opposite side of body from more impaired side.
Velcro open and close
Tupperware
One Last thing.....

Accessing literature through Pub Med  NCBI