Motor Development Issues

• The assumption that early stimulation is good and deprivation is bad.
• What should children experience in early education programs?
• What models have been used to develop and acquire motor skills in both a clinical, adaptive, and physical education environment?
Stimulation & Deprivation Concepts

• Effects of early stimulation
  – No-programming versus a program
  – Types of stimulation programs

• Effects of early deprivation
  – Hopi Cradleboard & Infant development
  – Deprivation Dwarfism
  – Anna and Young Savage of Abeyron

• Concepts Concerning Stimulation & Deprivation
  – Critical periods
  – Readiness
  – Catch-up
Effects of Early Stimulation

No-programming
- Withhold instruction until child learns to control their body
- Avoid systematic practice of specific skills
- Avoid assisting devices and techniques to acquire motor skills
- Let the child explore their environment unassisted

Program
- Parents take an active role
- Create a home environment that facilitates the child development
Effects of No-program versus Program

- Either program has show to have any detrimental effects
- Any gains in motor development seem to be contributed to exposure to normal stimulated home environment whether it be no-program or program.
Types of Programs

• Gymboree
  – Birth to 5 years
  – Found in 26 countries
  – Assumes that pre school children need certain types of play activities to develop normally
    • Non competitive and fun activities
    • Child is engage in physical fitness, arts, play, music, dance, and yoga.
    • Child engaged in self-discovery activities with the parents involving assisted devices such as balance beams, scooters, tunnels, hoops, and ladder
    • Involved free time and group activities
  – Claims made are improvement in balance, fundamental skills, appear to be less passive and dependent, better coordination and social skills
Types of Programs

- **Swim Programs for infants and toddlers**
  - Once the child achieves motor development of that of typical 5 year old, swimming skills will develop rapidly.
  - Programs should stress water adjustment, readiness, and orientation rather than drown proofing or waterproofing.
  - Beginning lessons before the child is read does not lead to more rapid mastery of swimming skills.

- **Suzuki Method of Playing the Violin**
  - First listen music while one learns language skills
  - At 2 or 2 ½ years, child starts playing the violin
  - Child should be willing and motivated to play the violin
  - Violin instrument needs to fit the child
  - Non competitive environment is stressed
Types of Program

• Head start
  – Preschool program to enhance social competence in children especially in low-incomes families
  – Social competence is having the child able to deal with a school and present living environment or “school readiness.”
  – Assumption these children intellectual, social, and emotional behaviors will be enhanced which will lead to greater academic success later.
  – Tracking 2100 head start disadvantaged children has shown:
    • 10 times more likely to finish High School
    • Short and long term effect on academic achievement
    • Disadvantaged students were able to catch up to other students.
  – What affect does head start or preschool have on child who are not disadvantaged in unknow!
Effects of Early Deprivation

• Hopi Cradleboard and Infant development
  – Babies tied to board with arms and legs in extended position so they could not touch their face or kick their feet.
  – In boards up to 23 hours per day starting shortly after birth to ages of 1 to 2 years.
  – Little effect on development of fundamental skills such as walking as compared to “while American children” not tied to board.

• Deprivation dwarfism
  – Child being in a non-stimulated environment for a long period
  – Experience failed grow gains in weight and height
  – Other conditions affected are speech development, withdrawal, delayed cognitive abilities, and psychomotor skill development
  -e.g., Study tracking 18 post pubertal participants with deprivation dwarfism; Gardner’s article about two orphanages; twins one male(abused) other a female (not abused),Anna; and Young savage of Abeyron (Victor).
Concepts

• Critical periods
  – Times when specific conditions or stimuli are required for optimal development (Cammeron & Demerath, 2002)
  – 4 critical elements of critical periods
    • Child needs to reach a state of readiness for environmental stimulation to be effective
    • There is specific time limit
    • Effects of stimulation or lack of stimulation during this period is permanent or long lasting
    • Critical periods exist for all of human behavior (cognitive, social, emotional, and motoric)
Concepts

• Readiness
  – Associated with critical periods
  – “a period of maximum sensitivity to develop a particular behavior or skill (Schiamburg, 1985).”
  – There is need to establish minimum characteristics necessary for a particular movement skill…before addition instruction or practice can be worthwhile, the prerequisite skills must be acquired!!
  – The movement specialist (teacher, coach, exercise leader, PT) needs to recognize the signs or states of readiness in their client, student, or athlete for instruction and/or practice to be effective.
Concepts

• Catch-up
  – Power of the human to be able to “return to a genetically determined growth path (Berk, 2004)”
  – Catch-up does occur in physical growth if it occurs during childhood.
  – Catch-up in terms intellect, social abilities, and motor abilities depends on severity, length, and time of deprivations. Most individuals never fully realize their genetic potential in these areas (Prader, Tranner, & Von Harnack, 1963).
Are early education programs valuable?

• Parents enroll their children in early education programs under the assumption that:
  – Perceived as valuable because they see other people send their child to these programs,
  – Produces a more intelligent children, and
  – the child’s development of motor skills will occur in a normal manner.
Perceptual Motor Programming

Notion: *If you are engaged in activities that are perceptual-motor they will accelerate or assure that your growth, development, and learning is progressing normally!*

Perceptual motor development is based on the works of Piaget, Gesell, and Montessori.
Perceptual Motor Programming

\[
\begin{align*}
\text{Tactile} & \quad \text{Vision} \\
\text{Audition} & \\
\text{Proprioception} & \\
\text{Vestibular} & \\
\end{align*}
\]

\[
\text{Senses} \quad \rightarrow \quad \text{Perception}
\]

Perceptual-Sensory System
Perceptual-Motor Process

- Reception of environmental information
- Feedback
  - Comparison of Information of present movement to past movement stored in memory
  - Movement selection
Characteristic

Involves children during preschool to primary grades; usually ages 21/2 to 6.

Combines movement abilities with academics (reading, writing, language, math)

Engages children in movement activities that integrates perception and movement.
Sensory Motor Process

Importance of sensory stimulation in the development of the one’s brain is well supported.

- Typical grow and development trends follows a sequence of events.
- The child passes through developmental stages through interaction with the environment.
- The environment provided the sensory stimulation to which the child adapts in order to grow & develop (Moore, 1969).
Sensory-Motor Simulation

• Ayres (1972) contends that inadequate sensory integration accounts for some aspect of learning disorders.

• Sensory integrative therapy has become popular as an intervention used primarily by occupational therapists.

• Piaget (1952) wrote that children develop through sensory experiences of tactile (touch), kinesthetic, visual, and auditory modalities which later forms the child’s perception.

• These sensory experiences are a necessary part of the total development of an individual.
Kepart’s Contention

The feedback process necessary for correcting errors in movement was faulty in children with learning disabilities.

Participation in basic forms of movement would help the feedback problems and consequently improve the child’s learning of academic skills, such as reading and spelling.
Delacato’s Contention

Involvement in certain forms of movement behavior facilitates intellectual development.

Key element was the development of hemispheric dominance through the process known as patterning.

Patterning was where the patient would practice a skill they missed or be passively assisted through movements which lacked hemispheric dominance.
Researching the Contentions of Kepart & Delacato

• Meta-analysis of 180 studies indicated that:
  – Children improvement was lowly but positive in their cognitive ability when involved in a perceptual motor program.
  – Perceptual motor program as in intervention to directly improve the child’s intelligence later in life was not support.
  – Many educators believe that a perceptual-motor program is an excellent medium through which reading, spelling, math, social studies, or math can be facilitated.
  – By having your child involved in perceptual-motor skills; they produced positive changes in their motor performance.
Perceptual (Sensory) Motor Program

Improvement in the perceptual sensory system occurs through environmental stimulation.

Not all activities are perceptual activities.

- Only activities involving children in sensory integration
  - Improve Balance (Vestibular)
  - Spatial Awareness (Understanding external spaces around the child- Audition & Vision)
  - Temporal Awareness (Ability to predict when stimuli arrives- all senses)
  - Body & Directional Awareness (Ability to know-proproception)
Balance

Static Balance
-ability to maintain a desired body posture or position when the body is stationary

Dynamic Balance
-ability to maintain a desired body posture or position when the body is moving.
Training Balance in Children

• Static Balance
  – Stand on both feet extend your arm, hold an object of different weights, move your arms,
  – Stand on one foot extend your arm, hold an object of different weights

• Dynamic Balance
  – Walk across a low balance beam with or with object of different weights at slow or fast speeds
The first tests of balance require support, especially when the child ventures onto difficult territory such as a narrow brick wall, a teetering onk, or a bouncy mattress.

Rolling barrels, cans, or wastebaskets offers challenges for balancing. Playing skills are refined through differentiated choice of play equipment.

Steps arranged at different elevations encourage playing much more than do level areas.
Balance Training in adults
Balance Training in Adults

**FIGURE 11-16.** Use of a force-plate biofeedback system to provide visual feedback regarding alignment and weight-bearing status.

**FIGURE 11-20.** The use of ice on the anterior tibialis muscle just prior to a small backward displacement to facilitate its activation during recovery of balance.
Awareness (Body Control Skills)

Spatial Awareness-Understanding of the external spaces surrounding an individual and the individual’s ability to function motorically in and through space.

Temporal Awareness-understanding of time relationships such as ability to predict the projectile’s time of arrival.

Body Awareness-developing ability to know and understand names and functions of various body parts

Directional awareness-understand and application of laterality and directionality.
Training of Awareness

Location
- Self-space
- General space
- Identify body parts

Directions
- Up/down
- Forward/backward
- Right/left

Levels
Low-Middle-High

Pathways
- Straight
- Curved
- Zigzag

Extensions
- Far/near
- Large/Small

Effort
- Fast/slow
- Strong/Light
Activities that Develop Visual Perception

• Forms & Shapes
  – Coloring
  – Cutting out shapes with scissor
  – Making shapes

• Catching, trapping, and striking

• Throwing

• Locate Objects in space
Activities that Develop Proprioception

• Recall limb position
• Left/Right Discrimination
• Levels (UP/Down; Front/Back; Side to Side)
• Swimming, skipping, batting
• Foot-eye & Hand & Eye activities
• Cue children to locate objects on their body
• Balance activities
Activities that Develop Auditory Perception

• Simon Says (Ability to listen)
• Child changes direction upon command
• Tapping to beat of sound
• Moving to the beat of music, sound, or voice
Perceptual Motor Program Design

- Start with easy activities and progress to more difficult (developmentally appropriate)
  - Low level skills
  - Intermediate skills
  - High-level skills
- Assess the child regularly on their abilities
- Refine your training based on perceptual motor deficiencies.
Models of Acquiring Movement Skills

Haywood’s Model

Ecological Task Analysis Approach
Haywood’s Model

- Appearance and Refinement of a New Skill
- Increase in Movement Product
- Acquisition of Skill Combination
- Improved Environmental Response
Progress Gauged

• 1) Appearance of a new skill
• 2) Refinement of a new skill
• 3) Increase in Movement Product
• 4) Acquisition of skill combination
• 5) Improved Environmental Response
Appearance of a New Skill

• First time a skill is attempted.

• Skill that has appeared is throwing.
Refinement of the Skill

• First develop a skill in isolation.
• Teacher needs to develop movement activities that motivates the child to persist and practice this skill in isolation.
• Example
  – Throwing different colored balls
  – Throwing different sized balls
Increase the Movement Product

• Second step the teacher should then set standards of mastery

• Example:
  – Be able to throw and hit a target 8 out 10 times.
Acquisition of Skill Combination

• Third step is to combine the primary skill with another skill

• Example:
  – Run and throw
  – Skip and throw
  – Walk and throw
Improved Environmental Response Match

• This is final step
  – Throwing in a game
  – Throwing in baseball
  – Throwing in soccer
  – Throwing in different contexts
Ecological Task Analysis Approach to Motor Development

Davis & Burton
Steps

1. Establish Task Goals
2. Student Choice
3. Manipulating Variables
4. Provide instruction
ETA Model

Task Goals → Student Choice → Manipulate Learner & Environment → Instruct → Task Goals
Establishing Task Goals

Movement specialist design their clinic or classroom:
- Station approach
- Each station represents a movement
  - striking, throwing, kicking, catching
- The theme of the day would be manipulative skills.
Client Choice

Let the client or students at each station practice the movement without prior demonstration or instruction.

Movement specialist role is to observe and assess the student stable and unstable movement based upon movement form (desired or not desired) and developmental (immature and mature) stages.
Manipulating Performer, Task, and Environment.

Very similar to refining and extending activities of Haywood model.

The client is encouraged to choose how they want to perform the movement. The movement specialist then changes the environment or task or performer characteristics.
Environmental Changes

With or with implements
Practice in blocks
- Stay at one station throughout the entire session or lesson
Practice stations randomly
- Practice all the station but in no set order

Spatial changes
- Distance between object & targets
- Distance between partners
- Distance short or long

Locations
- In a corner
- Sitting, standing, walking, running, skipping, etc.
Task Changes

Object size changes
Object weight changes
Object color changes
Object type changes
Pathways change
  - straight
  - low or high
Performer Changes

Fast or slow
Hard or soft
Light or heavy
Instruction

Instruction is not provided immediately but after the first three stages. Instruction is provided through demonstration and verbalization. Peer can be used for the demonstration. Student are provided practice.
Resources

**Articles**

**Books**
Project Beacon, Fairfax County Public Schools, 10700 Page Avenue, Fairfax, VA.
Motor Control: Theory & Practical Applications. Shumway-Cook & Woollacott, Lippincott Williams & Wilkins.
The important Eary Years, Diem, AAHPER.
Motor Development and Sport Skill Clinic, Millslagle, Edwin Mellon Press