CHAPTER 11

THE STAGES OF LEARNING
THIS CHAPTER’S CONCEPT

Distinct performance and performance characteristics change during skill learning
FITTS & POSNER’S MODEL

- Cognitive Stage
  - Performers characteristics are:
  - What should professionals do at this stage?

Continued
FITTS & POSNER’S MODEL

- Associative Stage
  
  • Performer’s characteristics at this stage are:
  
  • What should professional do at this stage?

Continued
FITTS & POSNER’S MODEL

- Autonomous Stage
  - Performer’s characteristics at this stage are:
  - What should the professional at this stage do?
GENTILE’S MODEL

- Initial stage (Getting the Idea of the movement)
- Later stage (fixation/diversification stage)
At the Initial Stage of Learning

- Acquire a movement coordination pattern that allow some degree of success.
  - Beginner develops a movement that matches the regulatory conditions of the environmental context.
- Discriminate between regulatory and non-regulatory conditions
  - Characteristics in environment which directly influences the movement required to reach a goal.
  - Characteristics in environment that do not influence the movement required to reach a goal.
At the Initial Stage of Learning

Beginner needs to explore a variety of movement possibilities.
- trial & error
- self-discovery
- problem solving

Provide a practice that:
- learner’s develops the basic movement pattern
- provide an environment where regulatory and nonregulatory characteristics can be discriminated
At the Latter Stage of Practice

- Performer is able to adapt the movement to any performance situation.
- Performer increases their consistency in achieving their goals.
- Person increases their economy of effort in performing the movement.
At the Latter Stage of Practice

If it involves a closed Skill – movement become *fixated*, that is, refines the movement pattern so consistency is achieved with little, conscious effort and minimum energy.

If it involves a open skill – movement requires *diversification*, that is, capacity to modify the movement pattern according to the environmental demands.
At the Latter Stage of Practice

- If closed skill is being developed
  - Need to practice the skill including the characteristics the learner will experience in the everyday world.

- If open skill is being developed:
  - Systematically vary the regulatory conditions of actual performance situations as they would appear in the everyday world.
PROFESSIONAL IMPLICATION

- Goal of practice in stage one
  - Develop the basic movement pattern regardless if it is an open or closed skill

- Goal of practice in second stage
  - Closed skills require a structure similar to actual performance
  - Open skills require one to vary the conditions.
PERFORMER AND PERFORMANCE CHANGES ACROSS THE STAGES OF LEARNING

- Rate of improvement
- Changes in coordination
- Altering an old or preferred coordination pattern
- Muscles used
- Energy cost

- Achievement of kinematic goals
- Visual attention
- Conscious attention
- Error detection
Rate of Improvement

- Negatively accelerated pattern is more typical of motor skill learning than other patterns.
  - Early in practice we experience a lot of success but later in practice amount of improvement rate decreases. (Snoddy’s Power law of practice)
  - The rate in improvement is task specific
Change in movement coordination

- We need to free the degrees of freedom so movement can be fluid.
- At the beginning, our limb-segmentation (joints and muscles) are frozen (move as one unit)
- Later in learning, our limb-segmentation becomes functional or unfrozen (move in a cooperative way)
- E.g. soccer kick & stroke patients sitting to standing and then to sitting involving hip and knee joints
Altering an old or preferred coordination pattern

- We possess a preferred way to perform many motor skills.
- When acquiring a new coordinated pattern to a already learned skill there is transition period.
  - We will resist for period of practice (continue to perform in the preferred way - biases)
  - There will be period of instability in limb movement.
  - Eventually we will adopt the new preferred pattern
- We need to provide extra…extra motivational reinforcement and feedback during this transition period.
Muscles Used

In early practice, muscle activation or involvement is incorrect with increases the number of muscles used to produced a given movement.

In later practice, muscle activation becomes appropriate which reflects a reorganization of the motor control system.
- The muscles are activated accordingly to a specific sequence.
Energy Cost

- Once the muscles are activated accordingly to a specific sequence, the performer is more economical in their use of energy.
- Economy of movement refers to minimizing the energy cost of performing a skill.
  - Physiological energy (oxygen uptake)
  - Mechanical energy (calories cost)
- Across practicing a complex skill, decrease in energy cost and rate of perceived exertion where as mechanical efficiency increases.
Kinematic goal changes

- Displacement, velocity, and acceleration defines the spatial and temporal features of the performance
  - Spatial features (displacement) of the skill is achieved first then temporal features (velocity and acceleration).
    - Implications are to focus on spatial features in the beginning and temporal features later.
Visual Selective Attention

In review,

- Beginners look at too many things whereas high skill performers direct their attention to appropriate environment cues.
- Experienced Soccer goalkeepers' eye fixations were less but were longer in duration, located the ball faster, better in predicting ball direction, etc... then inexperienced soccer goalkeepers.
Conscious Attention

- Early in learning, learner consciously thinks about every part of the skill.

- Late in practice, learner amount of conscious attention diminishes to a point where they perform the skill automatically.
Error Detection

- *Ability to detect and correct one’s error improves during practice*
- Major determining factor in the learner between early and latter stages of practice
What performance characteristics do not change?

- Learning is specific to sources of sensory feedback available during practice.
  - We use the primary source (e.g. vision) as form of feedback the same way in beginning to later, more skillful stages.
  - Mirrors in dance and weight training rooms!
    - Presence provides added sources of visual feedback but performer became depended on mirrors and did perform well when removed.
EXPERTS

- One becomes experts from practice
  - How much practice is need?
- Experts knowledge is more conceptual than novice
  - Expert solve problems and make decisions faster.
- Experts know how to perform in a specific situations
- Experts “see more” and anticipate the actions of others by experience not visual acuity.
- Experts can correct their own errors.
Can we predict one potential from initial practice?

Three approaches to answer this question:

- Examine the relationship between initial practice to later performance.
- Examine the relationship of every trial from the beginning to later performance.
- Examine the relationship of performance across practice to changes in underlying motor abilities changes across practice.
Results using these approaches

- First approached indicated that relationship between initial to late practice was about the same as flipping a coin and calling heads or tails.
- Second approach looking at each trial across practice indicated that early practice is a poor predictor of performance later in practice.
- Third ability – performance approach indicated prediction was impossible from early to later practice.
What’s the point?

Don’t be fooled or discouraged by initial performance practice results.

We should be aware of coordination pattern changes in performance to give us cues on the rate of learning.

We should rely on task analyses (Gentile’s model) in providing developmentally appropriate activities during early and late practice.

Screening tests to assess potential performance success needs to be task specific not general and conducted by skillful performers or professionals who know.
Professional Implications

- Early in learning a skill, one should:
- Once you have the idea of the skill, one should:
- Practice a closed skill how?
- Practice a open skill how?
- We become better in performance in what ways?
- An expert possess what performance characteristic?
- Prediction of future success in performing is?