DEMONSTRATION AND VERBAL INSTRUCTIONS
A common belief is that demonstrations are always effective in conveying information to the learner.

This is actually a myth!!!
Demonstration Research Questions:

- What does the observer perceive from a demonstration?
- What should be demonstrated?
- Do we really need to demonstrate the skill correctly?
- How should we implement a demonstration when working with groups?
- Does it really matter when we demonstrate?
- Why does demonstrations affect one’s learning rate?
DEMONSTRATION

- McCullagh and Weiss (2001) and Williams & Hodges (2005) reviews conclude that, “practitioners should use demonstrations only after determining that the instructional situation indeed warrants the use of demonstrations.”
Demonstration & Instruction

• What does one really pick up from a demonstration?
WHAT DOES ONE “SEE” WHEN A SKILL IS DEMONSTRATED?

- *Seeing* is defined as what we perceive is important rather than *looking*

- “The observer perceives and uses invariant features of the coordinated movement pattern to develop his or her own movement pattern” to perform the skill.
How to study what we perceive (perception of human motion)?

- Point-light technique
- Ski simulator research
- Eye tracking research
- fMRI research
Point Light Technique

FIGURE 13.1 An example of use of the point-light technique in motor learning research. (a) shows the...
Point Light Technique

From this type of research 2 important conclusions were found:

1. People can recognize different movement patterns accurately and quickly without seeing the entire body or all the limbs.

2. The most critical information people perceive in order to distinguish the movement is the invariant relative time relationship between the components or parts of the skills.
Ski simulator Research

- Ski simulator study involving observing skill model performing the task or received verbal information.

“The landmark results from ski simulator studies comparing novice to experienced models was that participants who observed skilled demonstration developed the coordinated movement pattern earlier in practice.”
fMRI research

• Rizzolatti (1990) discovered that when monkey’s observed another monkey the F5 area of their premotor cortex became active. These neurons were called “Mirror neurons” (visualmotor neurons).

• Further studies showed that:
  – When participants were asked to observe with the intent to imagine themselves imitating the movement, supplemental motor area (SMA) of brain of the cortex was activated.
  – When participants were asked to judge the movement, the pre-SMA area was activated

• There is substantial proof that there mirror neurons exist and are active when observing a demonstration.
The most important characteristics of an effective demonstration is?

“the demonstration must include the acquisition of a new pattern of coordination”
A common guide in giving a demonstration is

- Perform the skill correctly (mastery model)
Why use a mastery model?

1. Quality of demonstration is related to invariant movement patterns

2. Individuals pick up the strategies used by the model to solve movement problems.
Should I have a novice observe other novice practice? (Coping model)

- What are the benefits of having a unskilled performer demonstrate the skill?
  - Discourages imitation of the skilled performance model; encourages active problem solving (*active learning*)
  - Decreases distress, demonstrates strategies, demonstrates progression, enhances self-confidence.
  - Research has shown that coping model is effective for early learner but not highly skilled.
Implementing coping model demonstrations

- Pair learners together in situations where one of the pair performs the skill while the other observes.
  - Both the performer and observer is given verbal feedback by a knowledgeable person.
  - Provide the observer with a checklist of key aspects of the skill. Observer should look for each aspect, check it on the list and then provide feedback.

- Observer engages in problem-solving activity which facilitates the up coming performance.
When should one demonstrate a skill (timing of demonstrations)?

- Gentile’s contends the benefits of giving demonstration occur:
  - Before the person begins practicing the skill
  - When one continues to demonstrate during practice frequently as necessary

- Research
  - More frequent one observes a skilled demonstration, the more opportunity the beginner will have to acquire the movement (Corroll & Bandura, 1990)
  - Weeks & Anderson (2000) study indicated the importance of having several pre-practiced demonstrations over interspersed demonstration in both practice and retention.
AUDITORY MODELING

• What type of skills need auditory modeling?
  – Skills for which goal is to move in a certain criterion movement time or rhythm.
    • Dance steps
    • Moving to a specific pattern within a given time period (e.g. assemble line production or you only have six second to accomplish a sequences of movements)

• Two practical research examples:
  – Wuyts & Buekers (1995) study involving people who had no dance experience, learned a 32 sequential steps of a dance routine by hearing the rhythmic timing of dance routine is the same amount of time as other dancers who saw the dance routine.
  – Lae et al (2002) found that auditory modeling enhanced the learning of the keyboard. Each key had a different tone and they learned if faster over the traditional method.
Why does observing of demonstrations influences learning?

- Bandura (1996) Cognitive mediation Theory explanation:
  - When we observe a model, “he or she translates the observed movement information into a symbolic code that forms the basis of a stored representation in memory.”

Continued
Subprocesses governing observation learning

- Attention (information one extracts from the model’s actions)
- Retention (the person codes then stores this observed information in memory)
- Behavioral reproduction (the person has to turn this coded stored information into a action or movement)
- Motivation (the person’s movement influences the person’s motivation to perform).
Why does observing of demonstrations influences learning?

- Dynamic viewing of modeling.
  - J.J. Gibson...questions the view of symbolic coding is mediator.
  - Visual system is capable of automatically processing visual information.
    - Visual system picks up invariant coordinated information based on movement of limb segments which was proven by point-light research.
Implementing Demonstrations

- Demonstrations has the greatest impact when the skill requires a new pattern of coordination.
- When learning a new skill use verbal cues with a visual demonstration.
- Demonstrations should be frequent through practice.
- Pre-practice demonstration result in better practice and retention performances.
- Provide feedback to learner when demonstrations are used as primary instruction tool to learn the skill.
- Make sure the observer sees the critical features of the skill.
- If you cannot demonstrate a skill correctly, use a coping model.
- Pair beginner together when learning a motor skill.
- Use auditory demonstration for a skill that involve rhythm.
Part II

• Verbal Instructions and Cues
Why do we give instructions with a demonstration?

Instructions speeds the rate of learning a skill.
Factors to Consider when Giving Verbal Instructions

• Learner is limited in their ability to attend and remember
  – For the early learner or early rehab:
    • Don’t complicate & minimize verbal instructions
Factors to Consider when Giving Verbal Instructions

Instructions directed to intended outcome of actions rather than on the movement themselves are more effective (Action effect or constraint hypothesis)

Two ways one can direct attention to movement outcomes:
- Present instructions that establishes a discovery learning situation.
  *what will happen if you....
- Present instructions that involves the use of metaphoric imagery.
Wulf & Weigelt Ski Simulation Study

• Demonstrated the discovery learning situation
  – Outcome was to continuously move left to right on ski platform for one complete cycle
  – Participants in one group were given instructions and other group (guided discovery) was not given any additional instructions only told about the action goal.
  – Guided discovery group was poor in practice but on retention test 3 days later out performed the instructional group.
Guided Discovery: Skiing

- What would happen if you moved your hip more to the right when skiing?
- What would happen if you raised your right arm but lowered your left when skiing to the right?
- What would happen if you kept your eye focused on a spot 10 feet in front of you while your skiing?
- What would happen if you kept your eye focused on your feet while skiing?
Wulf, Lauterbach, & Toole (1999) study

- Demonstrated the metaphoric imagery concept
- College students practiced hitting golf pitch shots.
  - One group told to focus their attention on the swinging motion of the arms during each swing & provide instruction about the grip.
  - One group told to focus on head of the club pathway during the back and down-swing and image the club following pendulum like movement.
  - Group where they directed their attention to club movement were more accurate during practice and on retention.

(Metaphoric imagery study is very similar to external focus of attention concept!!!)
Do we need to be told....

- What to look for or looking at when they performed a skill?
  - People can learn to select relevant cues from the environment without being consciously aware of what those cues are!
  - People implicitly learn the critical environmental features that directed their movements.
WHEN DOES INSTRUCTIONS HINDER LEARNING?

When instruction about the movement features occur in situations where specific features looked for occur so *infrequently* in a series of trials.
Factors to Consider when Giving Verbal Instructions

Your instructions will bias the performer strategy to achieve the goal.
Verbal Cues

- Short, concise phrases that serve to:
  - Directs the performers attention to regulatory conditions
  - Prompts one to key on movement components of the skill
Cue Teaching in Badminton

Suipinate hand

FIGURE 4.1   Hand Action for Forehand
Overhead Clear

FIGURE 4.2   Forehand Overhead Clear
Cue Teaching in Basketball

Imagine basket looks like a big bin
Wrist points at rim
Thumb points at shoes
Gooseneck finish

Gooseneck finish
Thumb points at shoes
Everything stays in a straight line

(a) Side View
(b) Front View

FIGURE 6.3 Set Shot—Finish Position
Cue Teaching in Softball

URE 20.3 Arm Swing for Windmill Pitch
- Raise hand above head
- Circle to release point
- Release ball at hip

FIGURE 20.4 Release for Windmill Pitch
- Turn belt buckle to target
- Snap wrist on release
- Push off rubber with back foot
Implementing Verbal Cues

- Give verbal cues along with a demonstration to enhance visual information.
- Cues should direct the learners' focus of attention to the movement outcome rather than the movement themselves.
- Use verbal cues while performing to perform key aspects of skills.
- Verbal cues should initially be spoken by the performer.
- Cues should emphasize limb movement end-points or key spatial positions (e.g. 3 O’Clock; 6 O’Clock).
- Cues should be used as prompts (memory).
- Cues need to be limited in number to only the critical elements of performing the skill.
Movement Characteristics Related to Memory Performance

- **Location and Distance Characteristics.**
  - Instructions and demonstrations should concentrate on location points of the limb movement, especially end-point locations
    - Emphasize limb movement end-points or key spatial positions during movement in teaching a motor or sport skill (E.g. 3 O’clock; 6 O’clock; 12 O’clock)
    - Card sorting activity
      - Reshuffle the 12 remaining cards and place them face down making a circle that is associated with a face of the clock.
      - Now complete the task as before with only 12 cards staring with one and finishing with 12. Turn the cards over and wait for further instructions.
    - Most people can remember the beginning and end of the movement (Primacy-recency effect)
    - Movement end points are better recalled than distance movements.

- **Meaningfulness of the movement**
Verbal Instruction Summary

- Keep verbal instructions to a minimum
- Verbal instructions should direct one’s attention to regulatory conditions required to achieve the outcome or goal of the movement.
- Verbal instructions should direct the clients to external cues that relate to the movement.
- Verbal instructions biases one’s strategies to achieve the goal.
- Verbal cues should be used in the demo, when performing so they focus on critical parts of the skill (implicit memory).