

Children's Movement Patterns – Real versus Ideal (2014 version)

Defining efficient, effective alpine skiing, Nordic skiing and snowboarding has been a task aggressively pursued by PSIA/AASI. Each discipline has come up with “ideal” movements for their sport. However, children's physical development often makes achieving these “ideal” movements a challenge. It's important for instructors to understand human physical development to effectively teach new movements, and to avoid frustration for their students.

Difficulty with the “ideal” movements is not an excuse to let children ski, skate or snowboard poorly. Understanding “real versus ideal” movements is a guideline to help instructors with analysis and to target desired movements and outcomes. Children need time and experience with a new movement to experience and develop coordination and muscle strength.

The following sections describe the desired movements, the physical attributes of children and the way children move. Use these sections to determine which movements to focus on related to the skill level and development of your student.

Instructors need to first develop the skill before they teach the movement.

Alpine Skiing

Maintaining Balance

Visual Cues to Ideal Movement

1. Ankles, knees, hips and spine flex evenly and in unison.
2. Hips are over the feet and the head is over the hips or ahead of the hips.
3. Most of the skiers weight is directed to the outside ski.

Key development issues

1. Less coordination of the ankle joint (in a hard shell ski boot). Greater development of muscles around the hips relative to the lower leg.
2. Low level of experience.
3. Limited ability, coordination or experience with lateral movements.

Resulting movement patterns of children

1. Knees and hips are the joints primarily used, resulting in a stance with the hips slightly behind the feet.
2. Children will flex their torso forward to maintain balance over their feet.
3. Torso falls to the inside of the turn throughout the turn.

Recommended Instructor Behaviors

1. Use hopping, stepping and shuffle activities on gentle terrain to promote movement in the ankle joint.

2. Stay on moderate terrain to prevent the child from levering on the back of their ski boots.
3. Use lifting a ski, tapping a ski or raising the inside hand and arm exercises to develop lateral torso control.
4. On easy groomed terrain, teach students to ski medium radius turns with skis parallel; this will combine the skills while they work to maintain balance throughout the turn.
5. Be patient and use movement to teach movement!

Rotational Control

Refers to turning the skis about the vertical axis of the body. Skiers use this action to affect the direction their skis point.

Visual cues to Ideal Movement

1. The legs rotate under the upper body to guide the skis.
2. The femur rotates in the hip socket.
3. Upper body remains quiet, stable and strong.

Key Development Issues

1. Limited experience with rotational movements, oppositional movements or movements addressing one part of the body.
2. Hips and torso muscles and coordination are more developed than legs.
3. Understanding and coordination of cross lateral movements are less developed.

Resulting movement patterns of children

1. The body turns as a whole unit or the torso may lead the body into the turn.
2. As they attempt to move just their legs, they may fire other additional muscles resulting in inefficient body positioning.
3. They turn by pushing their skis away from their body with a straight leg.

Recommended Instructor Behaviors

1. Adjust your goal(s) to allow for the body turning, but not for the body to lead/initiate the turn.
2. Develop focus and tasks to help students find the right muscles to direct their skis.
3. Using flat terrain, teach them to stand over the top of their foot and direct their toes where they want to go.
4. On beginner groomed terrain, teach students to go straight down the run and then rotate both skis coming to a complete stop. Keep practicing until they can stop quickly and spray snow!
5. Be patient and use movement to teach movements!

Edge Control

Refers to tipping the skis relative to the length or longitudinal axis of the skis. Skiers use this action to increase or decrease the ski-to-snow angle.

Ideal movement

1. Skier uses diagonal and lateral movements of their feet, legs and hips.
2. Edges engage and release in one smooth movement.
3. The shins contact the boot cuffs to help direct the skis and engage the tips.

Key Development Issues

1. Limited movement experience on the lateral plane. Most movements to this point have been in the fore/aft plane.
2. Difficulty coordinating movements of multiple body segments.
3. Bones are stronger than muscles, so the child tends to rely on their skeletal system for support resulting in less flex in the joints.

Resulting movement patterns of children

1. Legs and body tip together to generate edge angle.
2. Outside ski is pushed away from the hips to engage the edge one ski at a time. Inside ski is often flat and used as an outrigger to support weight.
3. Skier levers on the back and side of the boot as the outside ski advances.

Recommended Instructor behaviors

1. Choose tasks that develop lateral movements. (Traversing, one ski skiing, skating, etc.)
2. Encourage exercises that promote offensive or proactive movements (releasing the edges with side slips) versus defensive or reactive movements.
3. On beginner groomed terrain, teach students to ski on the outside ski with the inside ski tail off the snow, building to having the inside ski completely off the snow through the turn. Without the inside ski to assist with lateral balance the skier will learn to engage the edge of the outside ski more effectively.
4. Choose gentle terrain so the skier needs lower edge angles and has an easier time maintaining boot cuff/shin contact.
5. Be patient and use movement to teach movements.

Pressure Control

Relates to managing forces acting on the skis. Skiers manage the distribution of pressure along the length of the skis, transfer pressure from one ski to the other, and adjust the overall magnitude of the forces acting on the skis.

Ideal Movement

1. Head and upper body remain stable as the body and skis flow smoothly over various types of terrain.
2. Joints flex and extend appropriately for terrain and pitch.
3. Skis bend through turn and the entire ski bends from the middle.

Key development issues

1. The head is proportionately large and heavy while muscle development lags.
2. There is a lack of coordination and strength required for flexing joints and absorbing terrain. Knee and hip flexion dominates movement. (Overly stiff boots contribute to this too.)
3. Bones develop more quickly than muscle, so children tend to resist forces with strong locked joints.

Resulting movement patterns of children

1. Head and torso bounce and the skis lose contact with the snow due to reduced activity in the ankle.
2. With stiff boots and limited control of the ankle joint, children control pressure by keeping both feet weighted in the turn.
3. Children tend to keep the outside leg straight to resist the forces of the turn with their skeleton. They may use the back of the boot to load the tail. The ski will bend from the middle to the tail.

Recommended Instructor behaviors

1. Focus on generating some flexing of the legs with a variety of activities and terrain choices. Hopping, stepping, hockey stops, rollers, dips, bumps and small jumps.
2. Utilize stepping, jumping and landing on beginner groomed terrain. The objective is for the student to be able to move from foot to foot and jump off both feet.
3. Keep speed and terrain conservative to reduce defensive movements.
4. Keep practice sessions short and focused to reduce risks of wearing out their muscles.
5. Suggest the student try softer flexing boots when possible.
6. Be patient and use movement to teach movements.

Motor Skill Development

- Gross motor skills- the larger muscles including the arms and legs. Evaluating gross motor skill development includes strength, muscle tone, movement quality and the range of movement.
- Fine motor skills – includes the smaller muscles in the fingers, toes, and eyes. The actions that require fine motor skills tend to be more intricate.

Physical Human Growth

Physical development in children follows a directional pattern

- Large muscles develop before small muscles. Muscles in the body's core, legs and arms develop before those in the fingers and hands.
- The center of the body develops before the outer regions. Muscles located at the core of the body become stronger sooner than the feet and hands.

- Development goes from the top down and from the head to the toes.

When teaching children pursue these three goals:

1. Help the student ski well with the movements they currently possess.
2. Provide movement experiences to develop muscle and coordination.
3. Stay focused on the environment ensuring a fun and positive snow sport experience they will want to repeat again and again!