Adaptive Snowboard Guide

2012

photo credit Larry Pierce/Steamboat Ski Resort

Table of Contents

Acknowledgements

This guide would not be possible without the incredible contributions of adaptive instructors across the country, whose belief is that people of all abilities can snowboard. Its content was developed using materials from the Rocky Mountain Division's *Adaptive Snowboard Resource Guide*, AASI's *Snowboard Instructor's Guide*, and PSIA-AASI's *Adaptive Snowsports Instruction* manual.

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Introduction

Since the early 1990s, adaptive snowboarding (ASB) has grown by leaps and bounds as teachers from all segments of the riding world have helped students with a variety of physical and/or cognitive challenges fall in love with the sport. Through the years, teachers involved in both adaptive and able-bodied snowboarding—working in collaboration with students as well as colleagues from the alpine and nordic skiing worlds—have developed and refined a wide range of ASB instruction techniques and concepts. The diverse, creative, and unique collection of crossover teaching techniques represented by this array of talented instructors greatly increases and advances the possibilities and options for adaptive students to find success as snowboarders.

Focusing on fulfilling their students' desire to learn to ride, these instructors have created innovative ways of sharing the sport of snowboarding with adaptive athletes. The critical element in adaptive snowboarding—as it is in all adaptive sports—is to modify/adjust the skills, concepts, and outcomes of the activity to suit the unique needs of each student. The material herein can serve those who work with able-bodied students (including those involved in other snowsports disciplines) as well as instructors and therapists who have previous experience in the adaptive community but are new to snowboard instruction. The intent of this guide is not to create an all-inclusive "bible" for adaptive snowboarding, but rather to demonstrate how established concepts used by the American Association of Snowboard Instructors (AASI) can provide practical insight when working with adaptive participants.

For an in-depth understanding of the language used and concepts outlined here, including the AASI Snowboard Teaching System (STS), please consult AASI's *Snowboard Instructor's Guide* and *Snowboard Movement Analysis Handbook*. PSIA-AASI's *Adaptive Snowsports Instruction* manual is a great resource on adaptive instruction in general, including greater depth of information regarding specific disabilities. For more information on the theory and practice of snowsports instruction not covered in detail in this manual—in particular such concepts as the CAP Model, Abraham Maslow's "Hierarchy of Needs," and a clear discussion of various learning styles—please look to PSIA-AASI's *Children's Instruction Manual* and *Core Concepts for Snowsports Instructors*.

Safety

Your top priority and responsibility as a snowsports instructor in any discipline is to help ensure that your students are safe and feel safe so they can focus their complete attention on learning. It is also important for you as an ASB instructor to help students understand and accept the inherent risks and responsibilities of using resort facilities and terrain. Please note that the combinations of terrain, weather, equipment, facilities, maintenance, and operations make it impractical to define a standardized safety protocol that is used at every school or area. As an ASB instructor, you should become familiar with and heed your individual resort and/or snowsports school's safety practices and approaches to safety education.

To help ensure a safe lesson for everyone concerned, your actions need to include:

- Taking the time to discover and account for the student's capabilities and limitations when making decisions regarding terrain choice, lesson pace, and lesson content.
- Making conservative terrain choices and taking weather and snow conditions into account during the lesson.
- Keeping track of time and safeguarding the student's energy level so it doesn't dip into the zone of fatigue.
- Considering skier/rider traffic on the slope when choosing stopping points and when suggesting maneuvers and activities—particularly those that take students *across* the slope.
- Taking time while traveling around the mountain to point out signs and symbols and to explain their meanings.

Every instructor should include discussions about safety with students, and make a point to explain decisions made during the lesson. Such an approach will help students become more involved in the decision-making process. In this way students can pass along what they've learned while freeriding on their own or with family or friends. Additionally, when the instructor is sharing safety information during a lesson, it lets the student know that the instructor is watching out for him or her and can thus engender a feeling of security that helps the student focus on learning and enjoying the mountain.

The National Ski Areas Association (NSAA) has created Your Responsibility Code, a set of self-directives that outline seven simple practices of safe riding and skiing. Instructors should abide by the following rules and, whenever appropriate, include them in the content of their lessons.

Your Responsibility Code

1. Always stay in control.
2. People ahead of you have the right of way.
3. Stop in a safe place for you and others.
4. Whenever starting downhill or merging, look uphill and yield.
5. Use devices to help prevent runaway equipment.
6. Observe signs and warnings, and keep off closed trails.
7. Know how to use the lifts safely.

All instructors should understand and abide by the safety protocols of their particular area.

Safe Lessons

In all beginner and lower-level lessons it is important to manage the risk of the student catching an edge and "slamming" into the hill. The key to a slam-free lesson is taking time beforehand to plan and make adjustments for your lesson's pace, maneuvers, terrain, and choice of appropriate adaptive equipment

and/or hands-on assistance. Moving at a student's pace and taking as much time as needed for him or her to feel comfortable will help ensure that the individual glides through a slam-free lesson.

Instructors and Their Equipment

All of the teaching concepts presented in this guide can be taught by an instructor using a snowboard, alpine skis, or nordic gear. You, as the instructor, can even use adaptive equipment along with your students. Remember, you are still teaching snowboarding so, when appropriate, provide accurate visual demonstrations for students to follow. Whatever equipment you choose to glide on during an ASB lesson, you must have strong skills on the equipment, a solid knowledge of the discipline being taught, and excellent communications skills. Note: Adaptive snowsports schools have different policies and protocols regarding equipment selection when teaching or assisting students, so be sure to learn and follow your school's specific approach and training.

Fun

Once you've covered safety information with your students, take time with them to simply enjoy being on the hill and riding. Appreciation of the sport can include the allure of being outside, the social experience of riding together, or the joy of messing around and sharing a joke.

Before moving to the next step in the learning progression, devote extra time to practice and enjoy the progress by getting in some quality riding. While many snowboarders are drawn to the sport for the thrill and challenge, others are attracted to its social aspects as well as the joy and camaraderie of riding with old friends and making new ones. It is also important to celebrate the accomplishments and milestones along the way.

Learning

Teaching to each student's learning style is fundamental to ASB instruction and a concept known as the Learning Partnership. This means that the instructor structures the lesson, presents information, and guides practice and feedback in a manner that meets each student's learning preferences. PSIA-AASI's *Core Concepts* manual provides useful information to help instructors understand and teach to different student preferences.

One commonly accepted theory is that students prefer to learn by thinking, feeling, doing, or watching. You should also consider each student's sensory preferences by teaching and communicating through a combination of visual, auditory, and kinesthetic (VAK) approaches. If you are working with a student whose vision or hearing is impaired, ask him or her the way in which you can communicate best and demonstrate the content of your lesson.

Chapter 1: Introduction to the PSIA-AASI Teaching Model

The guiding teaching philosophy for all PSIA-AASI instruction is encompassed in the Learning Partnership as well as the aforementioned lesson priorities of safety, fun, and learning. The Learning Partnership is a result of the interaction between you and your students, working together to achieve each student's goals. In this partnership you will mold your behavior and approach to the student's profile.

The Teaching Model

The PSIA-AASI Teaching Model (fig. 1) recognizes that students bring much to every lesson, including their background, prior experiences, and personal preferences for learning.

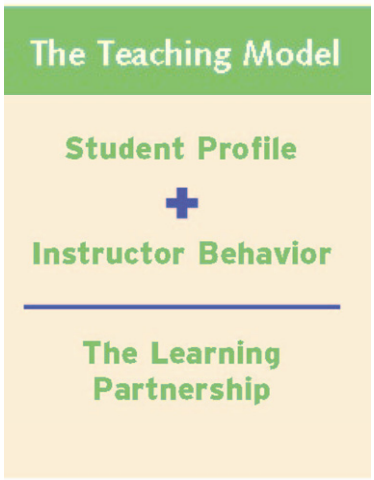

Figure 1: The Teaching Model

As with any person with learning and sensory preferences, adaptive individuals will respond to information in different ways:

- **Matchers and Mismatchers:** Matchers learn by finding similarities, while mismatchers learn by finding differences or flaws.
- **External and Internal:** Students who use external reference points evaluate new information in the context of what is normal and expected. Students who use internal reference points evaluate new information in comparison to their own rules and values.
- **Reflective and Impulsive:** Students who are reflective hang back and take everything in, organizing their thoughts and formulating strategies before deciding on a course of action. Impulsive students tend to learn by trial and error.

No matter how *you* learn, think, or process information, consider your students and how *their* learning styles affect how they take in information. The bottom line is that no two snowboarders use identical moves in order to make a board turn. Snowboarding as an activity consists of an infinite combination of applied movements that affect an infinite number of outcomes, from race carving to freestyle to sit-boarding, and everything in between.

The Teaching Cycle

The second part of the Teaching Model—Instructor Behavior— includes the Teaching Cycle (fig. 2), which encompasses much of what an instructor does during a lesson.

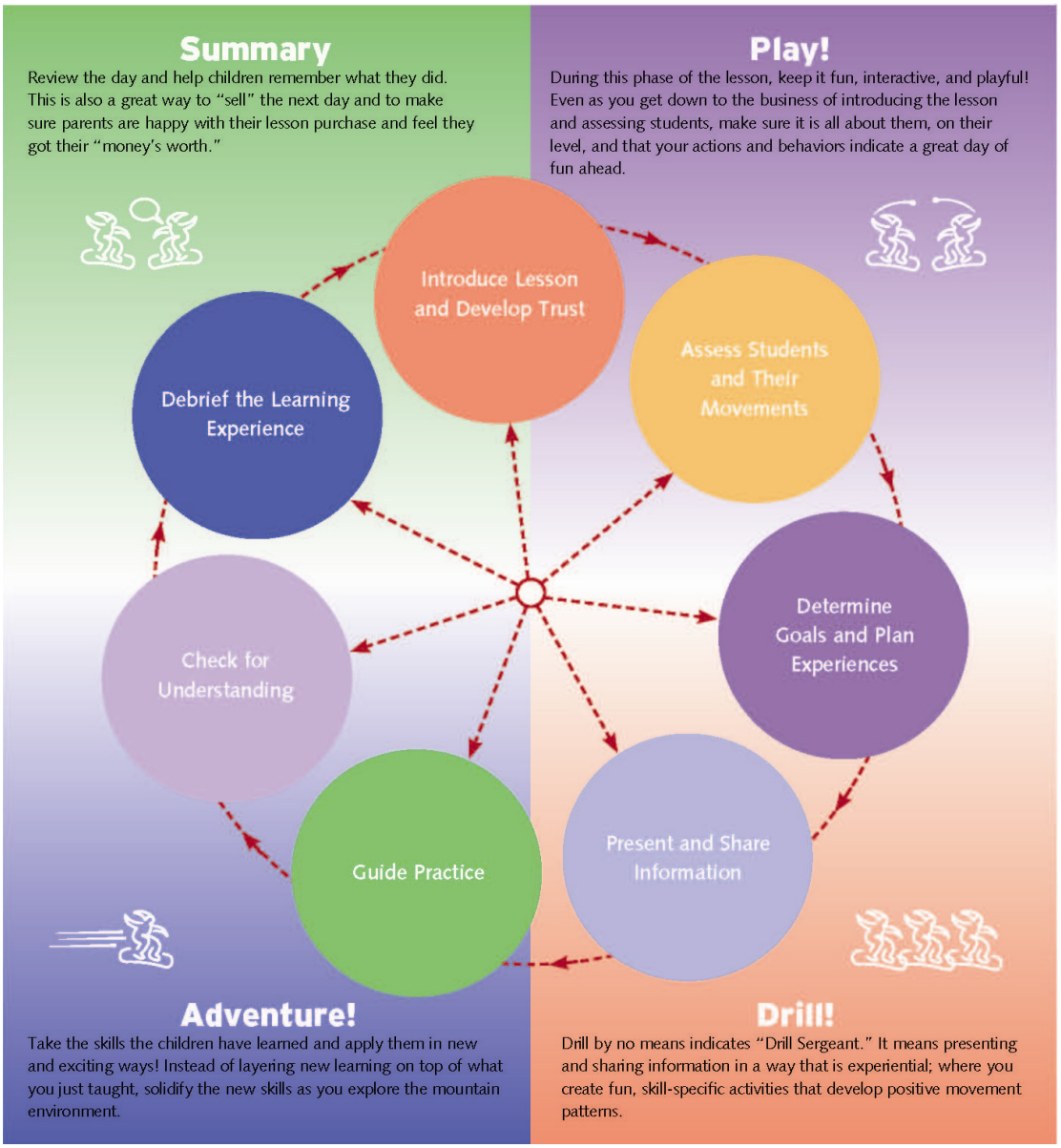

Figure 2: The Teaching Cycle

In adaptive lessons you will normally go through the different stages of the Teaching Cycle as you would with any other lesson. The assessment portion of the cycle is particularly important. An assessment of each student's strengths and weaknesses is vital, and such an assessment needs to include an overview of cognitive, physical, and visual abilities. During the evaluation, you should request and assess the following information to gain an understanding of the student's profile and create a lesson plan:

1. Information regarding the student's disability (or disabilities) and abilities, paying close attention to any aspects of the disability that will effect snowboarding.
2. Descriptions of prescribed medications, the side effects of any medication currently in use, and other relevant medical information you should know (e.g., preexisting conditions or allergies to medications).
3. A thorough description of the student's strengths and weaknesses (physical and mental), and motivations for snowboarding.

4. The student's goals, snowboarding and otherwise.
5. Equipment preferences, as well as a description of equipment that has been used successfully or unsuccessfully in past lessons.
6. Teaching techniques and strategies that have been successful in past lessons or in the student's other activities.

Chapter 2: The AASI Snowboard Teaching System

AASI's Snowboard Teaching System (STS) covers three main concepts: riding, teaching, and service. The concepts are determined by board performance, movement, and the learning process. Riding concepts provide a clear understanding of how the movements a rider makes affect the snowboard's performance over varying terrain. Teaching concepts cover how you as an instructor present and organize information for your students. Service concepts address issues such as how to make students comfortable, calm their fears, and show them how to have a great time learning and riding. Each of the STS concepts reinforces the others, and together form a learning pathway specific to each student.

STS is student-centered, meaning that the goals of the student must be the focus of the lesson. Thus, STS is based on outcomes and how each student benefits from the information provided. Although some students may take longer than others to achieve mastery, it is possible for anyone to accomplish personal riding goals with appropriate and student-centered instruction.

The Y Model

The Riding or "Y" Model is a graphical depiction of the most common snowboarding activities (fig. 3). The model resembles a brandy snifter, and the base of the diagram is where snowboarding begins—with the "new rider." The first-time riding experience is the foundation of the rest of a student's snowboarding life.

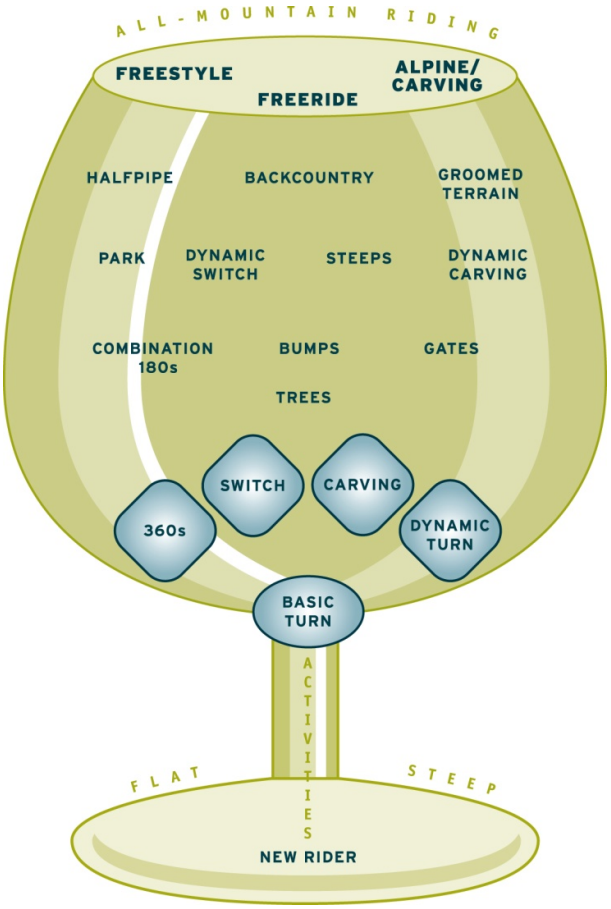

Figure 3: The Y Model

The stem of the metaphorical glass represents the period of learning in which riders gain an understanding of the movements necessary to create the desired performance. The common activities of a beginner lesson are represented by the base of the glass. Once riders successfully perform the elements of a turn, they will put them together to complete a basic turn (at the top of the stem). Tasks and skills learned up to that point are directed toward that goal. Beyond the basic turn, the diagram opens onto the world of all-mountain riding represented by the bowl of the glass.

The three general categories of riding include alpine, freeride, and freestyle. Alpine riders tend to prefer groomed terrain and carving their board on edge through the snow. Freeriders primarily use the natural terrain of the mountain to take advantage of bumps, steeps, backcountry, and trees. Freestyle riding consists mainly of using manmade features, and freestyle riders typically play in the halfpipe, ride rails, and go off jumps of different shapes and sizes.

The unique blends of riding represented by the Y Model have evolved considerably over the years. All three styles require similar skills and contain common elements, and all have aspects of the others embedded within each style. For more information on how to combine and refine snowboarding movements, see the electronic resource: *Pathways to Superior Snowboard Lessons: The 'Tiny Bubble' Approach* (ASEA 2004).

Every snowboarder will demonstrate aspects of the Y Model. To better understand the mechanics of what occurs while riding, you can simply watch the two main aspects of any rider on snow: movement concepts (that is, what the rider is doing), and performance concepts (what the board is doing as a result of the rider's actions and/or terrain). Snowboard teachers should be well versed in movements and performance to identify each. Every action has a *reaction* in the board. Understanding how the two are integrated is the key to teaching snowboarding.

Movement Concepts

Because snowboarding requires movement, it's important that riders understand how they are supposed to move, and why, in order to achieve desired results. Movement involves rotation, flexion, extension, or a combination of these elements. These movement concepts are fundamental in that they describe how muscles and joints perform, as well as the movements a rider can make.

The timing, intensity, and duration of the movement, whether it's flexion or extension of a joint or rotation of another body part, creates the direction and strength of the movement and resulting impact on the board.

Flexion and extension refer to the "closing" (decreasing the angle) and "opening" (increasing the angle) of a joint. Walking provides a simple example of using flexion and extension. When you walk, you alternately flex and extend at the ankle, knee, and hip, with each joint making the motions needed to propel you forward.

Rotational movements are necessary for changes of direction, turn initiation, and spinning in the air. A simple way to think of rotation is to recognize that you can turn your shoulders, arms, and head while keeping your feet firmly planted in place. To illustrate this, stand in a normal position, then turn your shoulders as close to perpendicular to your feet as possible. Chances are, if done properly, you'll feel some "rotary" forces trying to turn (or rotate) your feet back into alignment with your shoulders. Now, imagine doing this with a snowboard strapped on while standing on snow. Although using the feet and

legs to turn a board is the ideal, using the hips and shoulders is also a very powerful way to turn a board in the right circumstances.

Performance Concepts

The snowboard performance concepts of tilt, pivot, twist, and pressure are the *result* of movements or combinations of flexion/extension and rotary movements within the rider's body. They are a consequence of movement and snowboard-to-snow interaction, and are largely dependent upon each other. It is difficult to change one aspect of performance without it having an effect on the others. Understanding the movement concepts and their impact on the performance concepts allows you to assess the cause-and-effect relationships between what a rider is doing, and how to help the rider make changes.

TWIST

Twist refers to torsionally twisting the board along the long axis (tip to tail). Depending on the skill of the rider you may see twist in the board at any point in the turn. Typically, it's most visible at the transition from one edge to the other. Twist can be seen in a distinctive overlap in the tracks left in the snow by the edges, whereby the snowboard's old edge is engaged in the snow as the new edge engages due to active twisting of the board to start the turn.

At slower speeds the rider can actively generate twist through actions of the feet and lower legs. When trying to twist the board it's important to use subtle movements like flexing the ankle to pressure the toeside while lifting the toes of the other foot to pressure the heelsude. "Big" movements like pushing the hips can also work, depending on the goal. If you are trying a butter, a big move just might be the best choice. It's important to communicate that, when trying to twist the board, the rider is still trying to keep his or her weight equal over both feet.

Riding exercises for experiencing twist:

- While sideslipping or traversing on the heelside, bring only the toes of the front foot up toward the shin. An opposing movement with the rear foot is not needed to twist the board.
- While sideslipping or traversing on your toeside, flex the joints of the front leg and rotate the front leg toward the fall line. As the front edge of the board releases and the back the leg remains stationary, the board will twist.

TILT

When a rider tilts the board on edge, the snowboard edge angle is influenced by the riding surface and how hard that surface is. A simple way to think of this is to envision the snowboard on a hard surface, like a floor. As soon as *any* tilt is applied, the rider would be balancing on the edge only. At the opposite end of the spectrum, if the rider tilted the board while moving through powder the snow would give in to the pressure applied to the edge but the base of the board would still be in contact with the snow; just as if the rider were standing on a flat surface.

Slower speeds typically correspond to lower edge angles and thus allow for a larger balance platform. Higher speeds allow a rider to achieve higher edge angles while remaining in balance due to forces built up in the turn. The rider may establish and adjust board tilt with large movements of his or her center of mass (CM) relative to the working edge through flexion/extension of the ankles, knees, and hips, with smaller fine-tuning movements of the foot and ankle.

Riding exercises for experiencing tilt (edge angle):

- While traversing on the heelside edge, raise your toes toward your shins.

- While sideslipping on the toeside edge, “open” your ankles as if standing on the balls of your feet.

PIVOT

Pivot occurs when the board rotates around a particular point along its length. A reference pivot point should be centered between the feet. Depending on snow conditions, terrain, and intent, the pivot point may shift beyond the front foot. In extreme instances, such as during nose and tail rolls, the pivot point is out to the tip or tail of the board.

Riding exercises for experiencing pivot:

- First, imagine that the nose of your board has been staked to the ground yet is left free to rotate around that point. If you want to turn yourself around and face the other way you would have to lean forward over the nose and turn your shoulders in the direction you want to end up facing. The board would start to pivot around the nose. It’s important to note that the pivot point can be anywhere along the length of the board.
- Alternatively, using only the feet and legs, try to create a “bow-tie” shape in the snow. To do this, the pivot point will be in the middle of the board, between the bindings. Push the front foot forward while pulling the back foot back. Now, reverse the motion, pulling the front foot back while pushing the back foot forward. As you repeat the motions the bow-tie shape should start to form, with the narrowest part of the bow-tie between the bindings.

PRESSURE

The concept of pressure and pressure distribution has to do with where along the snowboard’s length (tip to tail) and width (edge to edge) pressure is most heavily applied and how to make this happen. Pressure adjustments—made through flexion, extension, and rotation— may be applied across the snowboard or concentrated in one spot. In a static position, with the rider in a stable, neutral stance, the feet are equally weighted and the rider’s weight is dispersed along the entire board. As the rider shifts toward the nose or tail the “pressure point” also changes.

An accomplished rider can make subtle changes in where along the board—and when—pressure is applied or released in order to achieve a desired outcome. Sometimes these changes are subtly made by minor flexion, extension, or rotation movements throughout a turn or through very obvious movements, such as when performing an ollie or wheelie. Pressure is also affected by gravity, what part of the turn a rider is in at any given moment, the amount of twist and tilt, and even how quickly a rider’s center of mass (CM) moves toward the board or how quickly the feet are pulled toward the CM (retraction).

Riding exercises for experiencing pressure distribution:

- While sliding, move your CM forward toward the nose of the board, and then backward toward its tail.
- While sliding, flex and extend vertically, or jump and land either loudly or quietly.

Reference Alignments (Stance and Alignment Relative to the Board)

Reference alignments are described as the relationship between the body and itself (body-body), the board (body-board), and terrain (body-terrain). Body-body alignment refers to how a rider stands relative to his or her stance angles. For example, are the hips approximately perpendicular to the front foot and is the weight evenly distributed over both feet? Body-board alignment relates to where the rider’s CM is relative to the working edge. For example, in a toeside turn is the rider balanced over and against the toeside edge? Body-terrain alignment speaks to maintaining a perpendicular relationship between the body and terrain as terrain gets steeper (rather than leaning back or too far forward).

When looking at the spectrum of riding, from first time to steeps to nose presses, it's important to remember that reference alignments are not intended as a "way to ride" but are to be used as a way to assess where a rider is, compared to a specific point.

From the start, riders should aim for a stable and efficient stance by balancing over either their feet or the base of support. The hips are centered between the feet to create even pressure distribution, without excessive bias toward the toes, heels, arches, or lateral sides of the feet. This starting point gives the rider the most options for balancing movements and control of the snowboard. A simple description of such a position would be an "active, athletic, ready stance."

Although all students are not likely to maintain identical position in this stance, the common element will be to find balance over the feet. The basic alignment of the knees, hips, and shoulders approximately perpendicular to the front foot (i.e., parallel to the board) allows the most variety of movement options for the rider. Such an alignment is maintained unless the rider seeks a specific outcome (e.g., a spin maneuver).

In order to picture this alignment, envision a rider fitting inside an equilateral triangle with the base of the board serving as the base of the triangle. The sides of the triangle will slope upward to its apex at the rider's head. Maintaining such a triangle requires flexing both ankles and both knees equally to keep the front hip and back hip at equal distances from the board. When ankles are not equally flexed, the hips become misaligned, followed by the shoulders, and reduce the rider's ability to make effective movements.

Movement Analysis

Movement analysis is the processes of observing students perform specific tasks, describing key movements, and analyzing the relevance and effects of those movements. When performing movement analysis, it's wise to have as little expectation or prejudgment as possible. A system of observation can be of help if it is quick and easy, or it can be a waste of time if it is overly technical and confusing.

When watching students move, the challenge is to:

- Evaluate specific movements made by the rider, noting when and where those movements happen.
- Evaluate how the movements affect the performance of the snowboard.
- Evaluate the role adaptive equipment plays in the rider's movements and its impact on the performance of the snowboard.
- Assess how the student's physical profile—from the initial assessment—plays out in his or her movements.
- Identify ways of meeting the rider's goals.

Your students may not be interested in all of the subtle movements that affect their riding. For the most part, they likely just want to ride and be better. With experience, you can readily identify those movements that have the biggest impact on their performance. This will allow you to prioritize and systematically identify what needs attention. A phrase such as "First, let's focus on how you make the board heavy or light" is something a student can grasp. "Whoa, I see about a zillion things we need to fix" is not.

As you observe students, try to get an overall picture of what is happening. Things to watch for can include the student's overall comfort level, whether his or her equipment is appropriate and set up correctly, snow conditions, and turn shape. Using different reference points (i.e., the nose or tail of the board) or measurement systems (i.e., "on a scale from 1 to 10, with 10 being tallest, you tend to stand at 8 all the time) is beneficial when observing and describing specific movement patterns. After you have observed and described your students' movements, it's time to assess cause-and-effect

relationships in terms of what the rider is doing (movements) and the result on the board (performance).

Observation and description apply not only to the initial assessment of students, but can be used throughout the lesson to refocus attention on different movements and performance.

Feedback is a central component of any lesson. This is where you, as the instructor, can really have an impact on the student. Feedback creates the connection between what the student did, or would like to do, and how to do it better. When delivering feedback, it's essential that you:

- Ask students if they would like feedback. For the feedback to be used, the person must be receptive.
- Provide feedback as soon as possible.
- Give feedback in objective terms. Speak to specific movements and results, avoiding "good" or "bad" statements.
- Relate the feedback to what the student goals are and present ways to improve that lead the rider toward those goals.

Chapter 3: Basic Snowboard Progression

When teaching adaptive snowboarding, you need to become as familiar as possible with the student's disability. In addition to talking to the student, take the time to talk to family members or the student's caregiver when appropriate. No two students are alike, even if they live with the same disability. There may, however, be many similarities.

Student assessments should also include a description of the student's physical and cognitive needs. Using such information, snowboard equipment should be set up with the cooperation of the student before heading out to ride. Additionally, the evaluation needs to be an ongoing process throughout the lesson because the student's strength and endurance—including muscular, cognitive, or visual abilities—can change and degrade due to physical or cognitive exertion. Fluctuations in weather and snow conditions can also affect performance to a considerable degree. Instructor notes written at the end of the lesson can be used to help inform future instructors regarding the rider's accomplishments, equipment requirements and setup, behavioral needs, and the starting point for the next lesson.

Some ASB students, such as those with visual, cognitive, or even physical impairments, will not require adaptive equipment. For these types of lessons, you can modify the lesson presentation and progression. At the same time, many students *will* require or benefit from the use of adaptive equipment for accelerating progress and providing a great experience. Related considerations—such as the student's goals, the instructor's abilities, snow conditions, and others—should help with the determination of what, if any, adaptive equipment might help the student succeed.

A progression is a sequence of tasks and exercises that develop a specific skill or skills. The progression approach in teaching situations works well for most students and makes class handling easier for instructors. As an instructor, you must keep the student's strengths and weaknesses in mind in order to determine the steps of the progression. Some students may need a progression that repeats certain tasks, and will spend more time learning and practicing specific skills. Other students may achieve the same outcome by following a leapfrog format and skipping over certain steps in what many would consider a typical lesson. Teach with the student's goals in mind and use different strategies to achieve a safe, fun, and successful snowboard lesson.

The progression starts with the student evaluation and equipment setup. Afterward, you can modify the progression and tailor each lesson to each student. All lesson plans should take into consideration the student's goals, abilities, and needs to achieve success. The important thing is to allow the student to claim ownership of his or her progress. One way to do this is to create a progression and set a pace for the lesson that meets your student's physical, cognitive, and emotional needs.

One strategy when introducing new skills is to use steps that go from static to simple to complex to freeriding:
Static: Introduce the skill or movement while standing still or even out of the equipment.
Simple: Isolate the skill or movement by using an exercise that allows the student to focus on that specific skill or movement (i.e., a traverse).
Complex: Apply the skill or movement while riding at a pace and on terrain that allows the rider to remain focused on applying the skill or movement.
Freeride: Apply the skill or movement while riding on appropriate terrain at speeds appropriate to the student's normal riding style.

The following list outlines the highlights and key ingredients of the snowboard learning progression that form the base and stem of the Y Model:

Student Introduction and Evaluation

- Meet with the student and, if possible, communicate with family or caregivers.
- Assess physical and cognitive abilities.
- Set goals with the student.

Introduction to Equipment

- Explain equipment, allowing the student to examine the gear and ask questions.
- Set up stance and equipment with the student.

Introduction to Environment

- Discuss Your Responsibility Code and safety.
- Explain and discuss the beginner area an terrain.

Introduce Stance and Balance

- Discuss positioning based on equipment and the student's profile.

Walking, Skating, and Climbing

- Assess mobility and discuss maneuvering in the beginner area.

Basic Glide to a Natural Stop

- Assess the student's stability and balancing skills while in motion.

Directional Changes

- Teach fade turns.
- Teach falling leaf or garlands, depending on the pitch of the slope.
- Teach on-snow 180s and 360s.

Chairlift Ride

- Emphasize safety.

Turns Across the Fall Line

- Coach how to allow gravity and friction to aid slowing down and stopping.
- Have the student focus on an appropriate stance as he or she balances on the edge.

Linked Turns

- Start with the turn that is easier for the student.
- Emphasize patience in moving from turn to turn.
- Promote commitment to complete each turn.

Be sure to know and understand the typical snowboard lesson taught at your area. Also refer to AASI*'s Snowboard Instructor's Guide* for additional lesson ideas.

Chapter 4: Adaptive Snowboard Equipment

This chapter is divided into two sections, with the first providing an overview of boots, bindings, boards, stance, and setup options for adaptive riders. The second section provides a list of adaptive equipment commonly used by adaptive riders. To provide the best options for all students, familiarize yourself with the equipment available in your program as well as the equipment available at local rental shops. An initial evaluation of the student will help you choose the appropriate equipment.

Part 1 – Snowboard Equipment and Stance

BOOTS

Snowboard boots provide the interface between the rider and the board, and their purpose is to transfer the movements of the rider's feet, legs, and body to the board. Boots should be snug, but not overly tight. They should support the foot and ankle, and keep the rider's heels or prosthetic foot from lifting in the boot while riding.

It may be necessary to make adaptations within the boot to improve fit, promote good body-to-board movements, and ensure a tight interface between any braces or prostheses and the boot. Adding foam inserts is a common modification for ensuring a tighter fit between the boot and the rider's prosthesis. Assess bootfit by checking for pressure in and around the toes, as well as the overall foot, ankle, and lower leg. You can check on the fit by asking questions and looking at the student's feet within the boots. Each foot may require a different size boot, especially if the rider uses an ankle-foot orthotic (AFO).

Hard boots are a less-common type of footwear that occasionally offer a useful alternative when fitting for adaptive snowboard students. These boots have a hard plastic shell similar to ski boots, and must be used with plate bindings. Hence, they're not compatible with traditional strap bindings. These boots are useful in situations where additional support is required or can be used as a final alternative for riders who are especially difficult to fit. Alpine ski boots with a very soft flex or alpine touring boots can serve as options to consider if hard boots would be helpful but are unavailable for the lesson.

BINDINGS

Snowboard bindings attach the boots to the snowboard, offer additional support, determine the rider's stance, and play an important role in transferring the rider's movements to the board. They can typically be adjusted to address stance angles, positioning of the highback, forward lean, and the fit and positioning of the straps.

It is important for the boot to fit snugly into the binding since the responsiveness of the board directly relates to the amount of play between the boot and the binding. For adaptive riders it's common to utilize fit foam or shims to improve the fit between the boot and the binding—in addition to changing the position or alignment of the boot in the binding to ensure comfort and control for the rider.

SNOWBOARDS

A wide variety of board choices and technology is currently available for adaptive riders. Boards designed specifically to make learning to snowboard easier are typically the best option for riders who are just starting out, and these can sometimes be a good choice for more experienced riders as well. These boards are typically very soft in flex and can have convex bases with a high degree of base bevel. The optimum length and width of the board depends on the height, weight, boot size, and ability level of the student. Typically, for a beginning rider look for a board that comes to mid-chest level.

When working with a more experienced rider, take into consideration his or her style of riding as well. The student's goals, personal style, strengths, weaknesses, and capabilities should be considered when choosing the type and length of board. Freestyle, freeride, carving, and powder boards are options. Because a tremendous range of options and technology exists, it's advisable to consult AASI's *Snowboard Instructor's Guide*, *32 Degrees: The Journal of Professional Snowsports Instruction*, and other snowboard publications and websites to learn more about different boards and how to size boards for students.

STANCE AND BODY POSITION

An important part of setting a student up on the board is determining his or her stance. The term "stance" refers to the position of the rider's feet on the snowboard, and can include the angle of the feet to the edge of the board, the distance between the feet, and the decision regarding which foot will lead down the hill. The goal is to find a stance that allows the rider to have a comfortable body position with equal balance over both feet. You should also consider the effect adjustments to the rider's boots and bindings can have on his or her stance and body position.

Guidelines for determining and setting up a student's stance:

- Set the student up with the board and experiment with stance indoors (i.e., assess and adjust before you get out on snow).
- Assess the student's natural walking stance and the direction his or her toes point when walking and standing. Are the toes pointing straight ahead, in a lateral (outward), or medial (inward) direction?
- Check the student's foot alignment in a standing position; his or her stance will typically mimic this alignment. For example, a rider who naturally stands with the toes pointing in may benefit from having his or her bindings turned in as well.
- Set up bindings to allow the rider to stand comfortably.
- Determine/measure your student's leg length; if there is a discrepancy between the lengths of the two legs or between a leg and a prosthesis, consider these options:
    - Use a riser, under the binding or within the binding to balance the hips parallel to the board.
    - If the difference is too large to use risers, or if risers aren't available:
        - Determine the rider's regular or goofy bias (i.e., left foot or right foot forward).
        - If there is no bias or the bias isn't strong, positioning the shorter leg as the front leg is generally more effective.
- Check the rider's lower leg and foot alignment. If the foot is supinated or pronated (i.e., tilted in or out, respectively) or pointed down or up in a rigid position:
    - Fit the boot to allow the foot to remain in a natural and comfortable position.
    - Foam shims can be used inside boots to support the foot and fill the gap created by positioning the foot in its natural position.
    - The sole of the boot should rest flat within the binding.
    - If getting the boot to rest flat inside the binding is not possible, use foam shims to fill the space between the boot's sole and binding where necessary.
- Check for comfort and range of motion to ensure the student can comfortably flex and extend his or her legs, shift weight from one foot to the other, and shift weight from toes to heels.

Part 2 – Adaptive Equipment

Adaptive tools and equipment are used to assist a student's ability to get the best performance out of his or her snowboard. Some equipment is designed to allow the instructor to physically assist the student while riding, and other types of equipment are intended to be used by students on their own. Several of these equipment options can be used with or without instructor assistance.

When choosing adaptive snowboard equipment the student's overall stance and balance should be considered first, followed by his or her ability to affect the four board performances of twist, tilt, pivot, and pressure. All equipment should be chosen to enhance a student's snowboarding experience and to improve stance, balance, and the ability to generate performance from the snowboard, in particular with directional changes and speed control. Using adaptive equipment in general can provide encouragement for adaptive students and support their cognitive and emotional needs simply by helping ensure a degree of success.

A list of different teaching aids and adaptive equipment follows, but be aware that these lists are not complete in terms of equipment available today or the various ways such equipment can be used. The lists provide examples and ideas for you as an instructor. Remember, being creative is the key to working with adaptive students and their equipment.

STUDENT-INDEPENDENT OPTIONS

Several of the student-independent tools described here—single and double outriggers, ski poles, bamboo poles, and the Delaney Pole—are similar in that they all create at least one more point of contact with the snow. The contact point often becomes the location, or friction point, around which the board can pivot. Having another "point of contact" with the snow can give the rider improved stability to tilt or pivot the board on its edge safely and with a little more ease than he or she might otherwise experience. Constant-force Articulated Dynamic Struts, or CADS™, provide a suspension and support system for the rider.

Outriggers

Outriggers (also known as riggers) are used when a rider requires additional balance and support, and can promote positive body alignment, enhance comfort, and provide the student with an additional sliding platform when riding and/or assistance for walking and skating as well. Depending on a student's balance and coordination, either one or two outriggers can be used. While there are no set rules for a rider's stance when using outriggers, a forward "Euro" style stance (i.e., with positive angles on both bindings) is frequently the best option for maximizing comfort and minimizing upper body rotation. Whenever possible, outriggers should be used as a transition aid between a Rider Bar (a "handle-bar" setup that attaches to the board under the bindings) and independent riding.

Riding with a Single Outrigger

When using a single outrigger, the rider should hold it in his or her lead arm. From heelside to toeside, the outrigger crosses over the nose of the board for each turn to provide support within the inside of the turn. A single outrigger is generally used to provide a third point-of-contact to help the rider tilt onto an edge. A single outrigger can also assist with pivot since the rider crosses the rigger over the nose of the board to help induce rotation and a weight shift.

Riding with Two Outriggers

Two outriggers are often used to aid rider balance when tilting the board on edge. When riding with two outriggers, the lead outrigger will be used in similar fashion to the single-outrigger approach. The rear outrigger should be positioned ahead of the rear foot, with its tip aligned between the middle of the rider's stance and his or her front foot. The rear outrigger should generally be positioned 4 to 12 inches from the toeside edge of the board.

Outrigger Setup

Outrigger setup and adjustment for adaptive snowboard students is similar to the setup for adaptive skiers. The length of the outriggers should allow the rider to maintain a natural range of motion within a

balanced stance. When using double outriggers for beginner and intermediate students, the outriggers need to be the same length. For more advanced riding or increased board tilt, the student might improve performance by using a rear outrigger that's slightly shorter than the lead outrigger.

The setting of the outrigger brake is also important. To determine the amount of brake needed for a beginner, have the student stand on a flat surface and place the outriggers in the snow close to his or her side. The claw should engage sufficiently to create resistance against the snow without digging into it. If the brake bolt is set too high, the student's elbow will jerk and the outrigger itself will be pushed backward by snow contact. As the student's skill and speed develop, it will likely be necessary to adjust the claw/brake to ensure that the rigger glides over the snow and does less braking.

Ski Poles

Ski poles are used for balance while the student remains stationary, climbs, or for propulsion across flat terrain. Poles are also used to assist with the stability, timing, and initiation of turns.

Keep a close eye on the student's stance and upper-body position when using poles. Poles that are too short may cause the student to hunch or lean over too much, making it difficult to maintain a balanced stance. Telescoping poles can be lengthened, shortened, and easily carried or stowed in a pack when they're no longer needed.

Bamboo Pole/Delaney Pole

The Delaney Pole is an extendable pole with discs at either end that can be used as a sliding base of support or to provide additional feedback for the rider. When the disc is removed, the use of the pole is identical to that of a bamboo pole. (Note: The Delaney Pole was developed to assist new riders in the 1990s, and is no longer in production. Thus, this tool may be hard to find.)

When using either the bamboo pole or the Delaney Pole, the student can touch the pole to the snow to assist with initiating turns and, therefore, control speed. The pole touches the snow to the inside of the new turn when initiating the turn, and provides a contact point around which the board can pivot. While riding, the student should keep the pole at hip level to maintain the alignment of the upper body.

The rider holds and uses the pole much like kayakers would use their paddle. The pole is held across the body using two hands, and the end of the pole is set against the snow to turn "around," similar to how a paddle is used in the water. The pole can help the rider develop confidence for heelside turns and switch riding. At an advanced level, it can be used to touch the snow just outside of the turn in order to create improved angles and reduce banking.

Additional tips:

- Used primarily to aid balance of the upper body and prevent over tipping on the toe- or heelside.
- Most effective when bindings are set at positive, forward angles.
- Watch for rotational input to the board from turning the upper body.
- Also can be used as a teaching aid with the student holding the device with his or her rear hand and the instructor riding with the pole in his or her forward hand.

CADS

Constant-force Articulated Dynamic Struts, or CADS™, are spring-loaded suspension rods—worn on both legs—that connect at the boot and extend to the rider's waist by means of a pelvic harness. The device functions as a suspension system that transfers weight from the legs to the rods, creating an

upward-lifting effect that relieves pressure on the rider's knees and quadriceps muscles. CADS benefit students with knee injuries as well as those students lacking leg strength.

INSTRUCTOR-ASSISTED OPTIONS

The following tools are used by the adaptive student and instructor working together, either in a face-to-face "dance" position or with the instructor riding uphill of the student. Both positions allow you to help the student control the edge angle through leverage (tilt) and offer physical support as he or she develops balance. By rotating your hands along the tool, you can help a student steer around the midpoint of the snowboard's axis (pivot).

Each of the accessories is a valuable option for hands-off teaching assistance when working with students who cannot tolerate, or get distracted by, a hands-on approach. The equipment can also help prevent "runaway" incidents, and can provide additional support around the student's waist and hips.

Horse and Buggy

One tool commonly used by adaptive schools is the Horse and Buggy, a homemade device that typically consists of a bicycle inner tube cut once to form one long tube, the ends of which are attached to two rigid poles (e.g., PVC pipe, bamboo poles, or ski poles) to form a "U" shape. Essentially, you attach one end of the inner tube to the end of a pole and wrap the inner tube one-and-a-half times around the student's waist before attaching the other end of the tube to the other pole. With the student in front, the instructor can hold the free ends of the poles to provide physical guidance. The Horse and Buggy lets you rotate the rider's hips into a turn, move the rider from one turn to the next, aid turn shape and size, and promote speed control.

Hula Hoop™, Ski-Pal™

A rigid hoop (such as a Hula Hoop) supports greater independence than the Horse and Buggy. With a hoop—which you can buy at a store or construct out of PVC pipe, a plastic valve fitting/connector, and duct tape—all you have to do is place the student inside and have him or her hold it as you maintain contact elsewhere along the hoop to enhance stability and help guide the student through turn initiation. This technique is similar to "the dance" (where the instructor and student hold hands facing each other) and can also be performed with the student holding the hoop while positioned outside of it. The Ski-Pal tool offers the same sort of assistance, but features a rectangular configuration as opposed to the round hoop.

Sno-Wing™

The Sno-Wing is operated much like the Horse and Buggy, Hula Hoop, and Ski-Pal, but is attached to the student and not continuously held by the instructor. The Sno-Wing resembles a wind-surfing boom that attaches to an inner waist-belt harness. It is secured to the student with the waist belt, and the advantage to its design is that it helps stabilize the student's upper body and gives the instructor a means by which to assist the student as needed for turns and speed control.

Rider Bar™

The Rider Bar is a waist-high bar that attaches to a snowboard directly underneath a standard binding system. Positioned lengthwise along the board, it enables adaptive snowboarders to control the edge angle of the board and/or torsionally twist the board by simply pushing or pulling the bar. The bar also stabilizes the rider's upper body and provides support for fore, aft, and lateral movements. The instructor can provide guidance and additional stability, as needed, by means of an attached handle.

Manipulating the Rider Bar has a direct and immediate effect on the student's snowboard. By pushing hands in opposite directions while holding onto the bar, the rider can alter the difference in edge angle between the tip and tail, thus creating twist along the length of the board. Simultaneously moving the hands in the same direction (either pushing away from the body or pulling back into the body) will tilt the board on edge. The bar allows students to perform an exaggerated tilting of the board, especially when pulling the bar on heelside turns.

The Rider Bar can be used in several ways. When starting out, the rider's body position should be tall, yet slightly flexed as he or she grips the bar. The elbows should be slightly in front of hips, with the forearm at a 90-degree angle to the upper arm. When providing instructor assistance with the Rider Bar, you can use either skis or a snowboard. Some instructors have observed more comfort and stability when assisting on skis.

Ghost Riding

Ghost riding is a student-independent learning option in which the rider uses his or her own board while holding an additional board equipped with a Rider Bar. The rider uses the other board to mimic the movements desired in his or her own board and as an external sliding base of support and balance aid. This approach is very similar to the "dance," or the use of outriggers and the Hula Hoop.

Tethers

Another common approach for assisting adaptive snowboarders is to use tethers, which can be attached to four possible points—the board's tip, the board's tail, the student's feet, or the student's hips. Tethering allows the instructor to be close to the student in a hands-off manner, and is used to help adaptive riders initiate and follow through with turns. Tethering can also help control a student's speed and—at times—reduce the chances of having a runaway snowboarder.

As the instructor you would tether the student from an uphill position or while following behind. When working with beginning-to-intermediate riders moving at slower speeds, tethering from an uphill position offers a very effective means of aiding control. When tethering you would remain positioned directly uphill from the student and make the same turns in sync with the student. Tethering from behind is most commonly used with students who have advanced riding skills and are capable of higher speeds and longer-radius turns. It's typically used when the student needs more help with speed control than with balance.

Tethers at the hips are particularly useful when the student is able to support him- or herself and does not favor hands-on guidance. This mode of tethering is effective for students who cannot use rotary movements to initiate a turn. You'd use the tethers to provide gentle movements that guide the hips in the desired direction as the student maintains balance on the board by moving the CM over the working edge. Such a technique is effective with low skill levels, where a rotational turn is required.

Tethers attached to the board at the tip are the most effective approach for riders who can shift their weight across the board to a new edge and initiate rotational movements from their lower body without assistance. Tethering from the tip can be complemented with a balance aid (e.g., a Rider Bar or a bamboo pole) to enhance the student's ability to move from edge to edge. You can use a board-mounted tip tether to help guide the nose of the board in the desired direction to initiate a turn, and at times can assist the rider as he or she completes a turn. The timing of your tethering/guiding movements must complement the natural initiation movements of the rider.

Tethers attached to the board at the tail are most commonly used to assist students with speed control and to help those who tend to over-rotate at the finish of a turn. Such riders can typically initiate turning movements from their front leg, hip, and shoulder. You can use the tether to help limit the displacement of the board's tail at the finish of the turn (caused by the rider's over-rotation).

Tethers attached to the tip and tail can be used to help the student control shape and duration of the turn. When tethering from both the tip and the tail, the instructor generally uses a combination of the techniques previously described.

Tethering from attachment points on the student's boots is similar to tethering from the tip or tail of the board. It is typically used with the instructor tethering from the student's front foot. Because tethering from the feet offers the instructor less leverage over the student, it is most useful when working with students who are smaller and lighter than the instructor.

General Guidelines for Using Tethers

- Use a light touch: it shouldn't be obvious to the student that he or she is being tethered.
- The tether should never touch or drag on the snow, and slack should be minimized.
- The instructor must possess the skiing or riding skill required to change directions quickly.
- Tethering from a snowboard generally requires mastery of the following skills and maneuvers: speed control, switch riding, synchronized riding, and heelside slides and falling leaf skills in both directions.
- Tethering from skis generally requires mastery of the following skills and maneuvers: wedge change-ups, stem- and step-turn skills, converging and diverging turns, hop turns, short-radius turns, skating, and hockey slides.

Tandem Riding

Tandem riding is an instructor-assisted approach used primarily with beginner students. By means of a snowboard with two sets of bindings, the instructor and student can ride together on the same board. Tilt and pivot are the primary board performances affected by tandem riding. Although the instructor maintains some ability to twist on a tandem snowboard, the use of two sets of bindings spread over the top of the board limits the effect of twisting the board. ***Note: This is a rare piece of equipment and should only be used by those experienced in its use.***

The Swivler™

Some adaptive riders make use of a Swivler, which is a rotational device mounted under the binding of the lead foot. Rotating the lead binding into a more comfortable, or natural, walking position decreases the rider's tendency to inwardly or outwardly twist against the lead foot and leg when skating with one foot out of the binding. The Swivler is particularly useful for students who prefer to ride with their prosthesis as their leading leg because it reduces the torque on the socket of the rider's prosthesis when skating.

Sit-Down Equipment

In the adaptive teaching world, sit-down riding is broken into three distinct categories: sit-boarding, mono-boarding, and "bi-skiing" in a snowboarding application. In mono-boarding and bi-skiing the equipment and techniques used are similar to those employed by mono-skiers and bi-skiers.

- Sit-boarding involves a seating interface mounted directly to the snowboard. The seat may be attached to the board facing forward or laterally. The rider sits low to snow and uses hands, hand picks, short poles, or highly modified outriggers for balance, propulsion, and as turning aids.

- Mono-boarding utilizes the same rig a mono-skier uses. A snowboard with an adaptor plate may be used rather than a single ski. The most frequently used snowboards are alpine carving or race boards because they are more narrow than standard boards, which allows for a quicker edge change. Teaching and riding techniques are similar to those used by mono-skiers and are covered in the *PSIA-AASI Adaptive Snowsports Manual*.
- Bi-skiing in a snowboarding context makes use of a split snowboard. See the *PSIA-AASI Adaptive Snowsports Manual* for more information on the bi-ski.

Guided Riding

Guided riding—whether verbal or a combination of verbal cues and hands-on support—is often used with visually impaired or blind students. In this niche of adaptive instruction, the guide can be considered as critical a component as the student's equipment. The subject of working with blind and visually impaired students is covered more fully in the next chapter.

Chapter 5: Rider Profiles

Each student comes to a snowsports lesson with unique characteristics, needs, abilities, and motivations. Instructors should take care to make a thorough assessment that will help determine the best communication style and teaching approach. This chapter describes six common types of impairment, with information to aid student evaluation, outline teaching cues, and provide equipment suggestions.

The different profiles are:

1. Visual Impairment — students with impairments ranging from diminished vision to blindness.
2. Auditory Impairment (Hard of hearing, oe "HOH") — students with impairment ranging from decreased hearing to deafness.
3. Cognitive Impairment — students with disabilities that affect intellectual processing of perception, memory, judgment, and/or reasoning.
4. Neurological Impairment — students with disabilities that affect the nervous system. (Depending on its manifestation, this impairment may also be cognitive, structural, or anatomical.)
5. Structural and Anatomical Impairments — students with disabilities that affect the muscular and/or skeletal systems.
6. Combination of Impairments — students with two or more disabilities that fall within the previous profiles.

Visual Impairment

Visually impaired (VI) students have different degrees of limited vision or are totally blind. The types of impairment can include: partially sighted, peripheral vision only, tunnel vision, poor depth perception, or the ability to see only shadows. The damage to the eye(s) or optic nerve may have been present from birth or may due to an injury or underlying disease.

Visually impaired students often use their other senses to perceive the world around them. Typically, their sense of feeling and hearing can be stronger when compared to that of sighted students. The instructors' assessment should include an evaluation of the student's other senses as well as a consideration of how to utilize the vision the student may have available. Depending on their previous athletic experiences, visually impaired students may or may not need more time working on their balance. Work on static and dynamic balance, on and off the snow, to evaluate and improve balance skills.

In general, instruction of visually impaired students works best when the student has both a guide and an instructor. Separating these roles will make it easier for the instructor to observe and teach more effectively without the additional responsibility of guiding the student. The student and guide work as a team, and this separation also provides the opportunity for the instructor to coach and train the rider's guide.

ASSESSMENT

The following assessments, specific to the VI student, should be added to the routine evaluation:

- The amount of vision, lack of vision, or any sensitivity to the eye(s).
- Assess both indoors and outside. This will help you identify any differences in vision that occur with dull light, low light, and bright light.
- The student's senses of feeling and hearing.
- The student's balance.

COMMUNICATION

Give simple, detailed descriptions to VI students so they can understand their equipment and surroundings. This includes: the general area, the trails they will be riding on, the sounds they may hear around them, and how crowded the lodge or slope is.

Use clear, concise words when guiding VI students. In most cases, *teaching* occurs when the team is stopped. *Guiding* occurs when the team is riding and moving forward. The guide should deliver commands with simple, continuous, and alternating sequences. If available, a radio system for communication between the student and guide can be effective.

Before heading out to the snow, the instructor, guide, and student should choose a command for an emergency stop, which will be used when the instructor or guide wants the student to stop immediately, without starting, continuing, or finishing a turn. Students may have to do a sharp, quick edge set if possible, or sit or fall down to stop suddenly. For safety, students must be able to demonstrate early in the lesson that they understand this command. Emergency stop words can be "stop," "sit," "crash," "dump," or any word that works for the team. Practice the emergency stop at the beginning of the lesson. This will reveal students' reaction times and confirm their understanding of the command. A general rule is that students should not ride without direct instructor assistance if they cannot perform this maneuver.

The terms "heelside," "neutral," “flat board,” "and," and "toeside" may replace "right turn" and "left turn." "Heelside" is equivalent to a heelside turn or heelside edge engagement. "Neutral" or "flat board" refers to releasing the edge and moving to a flat board. "And" tells the student to prepare for the upcoming turn or the next command. "Toeside" is equivalent to a toeside turn or toeside edge engagement. For beginner and lower-end intermediate riders, there is always a "neutral" or "flat board" command between each edge-to-edge command. Toeside, neutral, and heelside commands imply the transition between turn completion and turn initiation.

Once VI students can link turns, the instructor can state that the team will begin with either a heelside or toeside turn. Then, the instructor or guide calls out, "turn, and turn, and turn." It is imperative for instructors and guides to look up the hill to check traffic before moving out. It should be instilled upon students to ask their instructors, "Is it safe uphill before we start riding?" Also, before starting down a slope, instructors should inform their students about the snow conditions, terrain, and presence of other people or activities on the hill.

ADAPTIVE EQUIPMENT

The most important piece of “equipment” for a VI rider is his or her guide. Solid riding skills and good communication and understanding of commands between the guide and rider are very important. The guide can guide while leading, following, or riding alongside the student. As mentioned, a radio headset can be a useful tool to improve communication between the rider and guide.

Visually impaired students can become familiar with their equipment by “up close” visual inspection and/ or feeling the board, boots, and bindings. Students can create images of how the body moves onto the toe or heel edge from the instructors' descriptions. The instructors' description helps create an image of what is being explained. Oftentimes, the student can see or feel the example by demonstration or by means of a hands-on approach, as when the instructor touches and helps position the student’s arms. It is very important to ask for permission from either the student or his or her guardian/caregiver before using a hands-on approach.

It is common for visually impaired riders to experience a temporary loss of balance or equilibrium when they first start sliding. A Hula Hoop, Sno-Wing, Horse and Buggy, tethers, bamboo pole, ski poles, Ski Pal, outriggers, or a tandem board can be useful for these students. These tools provide an additional point of reference and help the student make increased use of their sense of feeling. They may also help offset any distortion students may encounter in their equilibrium.

SAFETY

Specific safety needs for visually impaired students include:

- Designating a word that serves as a command for the student to come to an immediate stop.
- In general, teaching (speaking that does not involved riding commands) only while stopped. This allows the student and guide to work together and ride without distraction, and/or prevents distraction for the student and instructor when the instructor is also serving as the guide.
- Outfitting the student and instructor with bright-orange vests that read "Low Vision" or "Blind Skier/Rider" for the student and "Instructor of the Blind" or “Guide” for the instructor. These vests inform other individuals on the slope to provide more space for this special team.
- Ensuring that the student’s hat or helmet doesn’t impede hearing.

Auditory Impairment

Hearing-impaired students have different degrees of hearing in one or both ears or are totally deaf. Damage to the middle or inner ear or nerve pathway may have been present at the time of birth or may be due to an injury or underlying disease. Students who are hearing impaired may use a hearing device and they may be able to read lips or use sign language to communicate. Be aware, however, that not all students who are hearing impaired can read lips or use sign language.

A loss of hearing can make it more difficult to balance on a snowboard. Balance drills may help improve this skill. A hands-on technique—with or without adaptive equipment—can be helpful. When working with hearing-impaired, be aware of the noise created by a skidding snowboard, and the effect this may have on the student and the instructor’s ability to communicate with them. This noise may be louder at different times so you may need to adjust the volume of your voice.

ASSESSMENT

The following assessments, specific to the student who is HOH, should be added to the routine evaluation:

- Determine how well the student can hear, as well as any specific aspects of the student’s impairment (such as greater or lesser hearing in one ear than another).
- Determine the best way to communicate with the student.
- Determine the student's balance, strength, and level of endurance.

COMMUNICATION

It is important to have the student's attention and to face the student who is hearing impaired before talking to them. Keep communication simple while teaching. Demonstrations and shaping or molding students' body into position (with permission before touching) can show students proper body position. Lessons with the hearing impaired should be conducted in the same way as they are done for students without hearing impairments.

ADAPTIVE EQUIPMENT

For students whose hearing impairment impacts their balance, props such as the Hula Hoop, Sno-Wing, Horse and Buggy, bamboo pole, ski poles, tethers, or a tandem board can be beneficial. These tools

provide students with an additional point of reference and help them make increased use of their sense of feeling to maintain balance.

SAFETY

Specific safety needs for hearing-impaired students include:

- Outfitting the instructor and student with bright-orange vests that read "Hard of Hearing," or "Hearing Impaired" for the student and "Instructor of the HOH" or "Guide" for the instructor. This will alert other individuals on the slope to allow more space.
- Remind the student to be aware that snowboarder's have a blind spot, and emphasize the importance of being very aware of their surroundings and other snowsports participants.

Cognitive Impairment

The intellectual capability for processing information is diminished for students who have cognitive impairments. Conditions that fit in this category include Alzheimer's disease, diagnoses that fit under the umbrella of autism, brain injuries, cerebral palsy (CP), Down syndrome, learning disabilities, and intellectual impairment. Students can range from a very young child with a mild learning disability to an adult with a brain injury or Alzheimer's disease.

Some students may be in good physical shape; others might not be able to tolerate long periods of activity due to lack of fitness or additional physical impairments. For students who have muscle weakness or activity intolerance, adjust the pace of the lesson to avoid fatigue. Some students may become easily frustrated by such things as a wrinkle in a sock, being cold, or being afraid. They may have a difficult time or not be able to explain a problem. Remember that all behavior is a form of communication. Take the time to work with the student and figure out the issue. Many students will respond best to firm and consistent guidelines while keeping the snowboarding experience fun.

Make sure to tailor the lesson to the age level and intellectual capacity of the student. Making the lesson fun and maintaining interest will frequently count more than a strict lesson plan. Teaching this student population can be very rewarding, so meet the challenge, go out, be safe, and have fun. Similar to the adjustments for students with visual or auditory impairments, modifications to the snowboard lesson progression for students with cognitive impairments will consist of mostly minor changes. Positive reinforcement, encouragement, and consistency are extremely important for a successful experience.

ASSESSMENT

The following assessments, specific to students with cognitive impairments, should be added to the routine evaluation:

- Assess the student's capacity to understand direction and to sequence directions.
- Assess physical strength and balance, and inquire about tolerance for activity.
- Determine emotional maturity, chronological age, and developmental age.
- Take time to speak to family members and/or caregivers for their insights about the student's abilities, behavioral patterns (including likes and dislikes), specific tactics or approaches that work well for the student, and any circumstances that could potentially distress the student.

COMMUNICATION

Students with cognitive impairments may have special communication needs, and it is important to remember that all behavior is communication. They may have different ways to communicate, such as using a picture book, sign language, or answering only closed-ended sentences. They may need to take

more time to express their needs or comprehend information. If the student follows a schedule or uses a contract at home or at school, he or she will do best following a schedule or contract when riding.

ADAPTIVE EQUIPMENT

For students with cognitive impairment, the hands-on technique can be helpful when practicing or learning skills, although this population of students may do better with hands-off teaching. Adaptive equipment that can provide support without direct physical contact includes: tethers, Hula Hoop, Horse and Buggy, Sno-Wing, Ski Pal, and poles. Many students will not require physical assistance.

SAFETY

Special safety needs for students with cognitive impairments include the following:

- Not all students will be aware of or comprehend safety needs and Your Responsibility Code. Establish the rules that need to be followed before the lesson begins. Review and follow the rules strictly throughout the day.

Neurological Impairment

Students with neurological impairments have disabilities that affect the nervous system, which can include brain traumas, cerebral palsy, epilepsy, muscular dystrophy (MD), multiple sclerosis (MS), spina bifida, spinal cord injuries (SCI), and stroke. Neurological impairments can be caused by a disruption of the pathways of nerve impulses throughout the nervous system due to interference, blockage, infection, trauma, congenital defect, or even an unknown occurrence.

Students with the same disability may have different strengths and weaknesses, and the individual's specific disability will have its own characteristics. While the neurological impairment classification encompasses a particularly wide range of symptoms, students will have similar needs that you as an instructor will have to be aware of:

- Students may experience fatigue easily due to decreased muscular strength and limited endurance. Watch for loss of focus, decreased coordination, or increased frustration as these phenomena can serve as indicators of fatigue. Pace the lesson by incorporating rest breaks. It is helpful to have a chair or bench near the practice area for such rest breaks.
- Depending on the disability, students can experience some cognitive impairment in conjunction with physical disabilities. Cognitive issues can range from processing information slowly to demonstrating types of aphasia (the inability to understand or utilize words and their meanings). Give each student the time to think and respond to what he or she has been asked or told. Tailor the lesson to the appropriate age and intellectual level.
- There can be a lack of feeling or movement in a part or parts of a neurologically impaired student's body. The student may have poor muscle control, muscular weakness, poor coordination, or paralysis in some extremities. A lack of feeling in the legs or feet may decrease the student's ability to feel the board, thus reducing his or her control over the board. Balance is more challenging when one or more extremity is involved.

In your assessment, ask questions that reveal whether a student has a history of seizures, and if he or she acts differently or senses an aura before a seizure. (An aura is a distinctive feeling or some other warning sign that a seizure is imminent.) Also, determine when the student's last seizure occurred, and if anything is known to trigger one. Be aware of the medication(s) the student is taking and the last time the medication was taken.

Any student who has a history of recent seizures must wear a proper restraint belt while riding a chairlift. Consult your school for which restraint belt to use. Instructors should know the safety policies and procedures of their program. A general guideline is that a belt is not needed if the participant has been seizure-free for two years.

ASSESSMENT

The following assessments, specific to students with neurological impairments, should be added to the routine evaluation:

- Observe how the student arrives at the program. Is he or she walking independently, with a limp, or with a notably weaker side? Check forward, backward, and lateral balance.
- Check balance while standing, and determine how long the person can stand. Can he or she transfer weight equally from foot to foot or does one foot/leg support more weight and pressure? Does he or she participate in any other activities that require standing?
- Assess the student's physical abilities and identify the point of control that is closest to the feet, thus closer to the snowboard.
- Assess foot strength and range of motion while sitting by supporting the student's heel with one hand while placing the other hand first on top of the student's toes, then below the toes. Ask the student to gently press his or her toes upward and then downward through his or her entire range of motion of the foot. You'll be able to feel if the pull of the foot is weak, mild, or strong, and can compare if the strength is the same for both feet. Such a test can indicate the student's ability to move onto the heelside and toeside edge.
- When a student arrives in a wheelchair, do not assume that he or she cannot stand. Determine if the student has the ability to stand, and, if the person can stand independently, find out how long he or she can stand.
- If the student is unable to stand, offer a mono-ski rig (a setup that includes a seat, suspension, and loading system), shredder plate, or other setups that attach to the snowboard.
- Evaluate the student's strength and endurance level. If the rider will be sitting, you must also consider arm strength and torso ability.

COMMUNICATION

Students with neurological impairments may or may not have special communication needs, and it is important to remember that all behavior is communication. They may have different ways to communicate, such as using a picture book, sign language, or answering only closed-ended sentences. They may need to take more time to express their needs or comprehend information. If the student follows a schedule or uses a contract at home or at school, he or she will do best following a schedule or contract when riding.

ADAPTIVE EQUIPMENT

Adaptive equipment makes riding possible for many students who have neurological impairments. Such equipment includes the previously aforementioned items: outrigger(s), Horse and Buggy, Hula Hoop, tethers, bamboo poles, ski poles, the Sno-Wing, Ski Pal or the Rider Bar, and CADs. All of these pieces of equipment provide physical support.

Outriggers can help to improve balance while a rider is walking and sliding. Depending on the disability, an individual can use one or two outriggers. Outriggers and tethers can be used together, and tethering can give a student a feeling of independence while the instructor offers assistance with turns and speed control. A student who is unable to stand for long periods or has increased weakness with standing may benefit from using a Rider Bar and/or CADS.

A student who is unable to stand might benefit from using a bi-ski, mono-ski seat, or mono-ski rig mounted to a snowboard. With such a setup, students can use outriggers, picks, or their hands to aid balance and initiate turns.

SAFETY

Special safety needs for students with neurological impairments include the following:

- A helmet is necessary for students who have had head injuries and/or seizures, or for a student who has a shunt (a device that diverts fluid from the brain into the abdominal cavity). The helmet should not restrict the shunt.
- Watch students who have a spinal cord injury to the thoracic vertebrae, or level 6 (T6) and above, for signs of autonomic dysreflexia.
- Individuals who have seizures under control with medications and have not had a seizure in the past two years may be exempt from wearing a safety restraint while riding the lifts. Check your program's policy for program/ski school rules on adaptive skiers.

Structural and Anatomical Impairment

Students with structural and anatomical impairments have disabilities that affect the muscles and/or the bones of the body. Disabilities that fall into this category include: amputation of one or more extremities, arthritis, cancer, cerebral palsy, diabetes, polio and post-polio syndrome, multiple sclerosis, muscular dystrophy, spina bifida, and hemiplegia. Students may also have neurological impairments in addition to their anatomical impairments. Therefore, each disability requires additional, specific evaluation.

UPPER-EXTREMITY AMPUTEES

Students who have upper-extremity amputations may or may not wear a prosthesis. These students tend to have good balance. Once the rider starts sliding, in an effort to protect the stump he or she might have a tendency to keep the amputated arm back and throw the shoulders back, resulting in a weak stance. Remind the student to keep the shoulder and residual limb forward, keeping it consistent with the direction in which he or she is moving.

LOWER-EXTREMITY PROSTHESIS

Students who use a lower-extremity prosthesis may have been born without a limb or with an extremity that is low functioning. Or they may have an amputation as a result of cancer, trauma, or other health complications.

In theory, there are no set rules to determine stance for students who wear a prosthesis (see "Rider Scenario #4" on page 53 for a sample setup). Consider dominant steering factors such as fore/aft movements and weight-bearing issues. As in any snowboard lesson, if the setup does not work, try the other foot in the lead position. Considering that there are many different kinds of prostheses, do your best to find out what works for each student.

Check for flexion and extension at the ankle, knee, and hip of the leg that is supported by the prosthesis. The placement of a heel lift in the boot with the prosthesis moves the rider into a flexed stance. Such a position can allow the rider to move more easily onto the toe- or heelside position. Also, consider how much weight bearing the leg, with the prosthesis, can withstand; such information can help you determine which foot will be the lead foot. Each student will move differently with his or her prosthesis, so evaluate flexion and extension related to snowboarding movement and stance while indoors, as well as outside on the snow with the snowboard.

The fit between the prosthesis and the snowboard boot is a vital part of the setup process. The following hints and guidelines have proven successful for many students:

- By placing the prosthetic foot into a plastic bag (e.g., a plastic grocery bag), the foot will slip into and out of the snowboard boot more easily.
- It may be easier for some individuals to put the prosthetic foot/leg into the boot first, then attach the prosthesis to the residual limb.
- The space created between the cuff of the snowboard boot and the prosthesis needs to be filled. Use a piece of foam rubber, a towel, or other material to fill this space. Once you've added the material, use duct tape to help hold the filler material in place. Filling the space helps to transmit the movement from the leg to the boot, then to the snowboard. Because filler has a tendency to shift, help your student check periodically to see if the filler is still in place.

Many students who regularly wear a prosthesis for everyday activities may use a different prosthesis for snowboarding and other sports. For someone who has more than one prosthesis, the one he or she brings to a snowboard lesson may be new, or the student might not have used it since the last time he or she snowboarded. In these cases, a change in a student's weight (that is, either weight loss or gain since the last time riding) can affect how the prosthesis fits. Be aware that a change in fit can lead to a loss of feeling or slippage between the limb and the prosthesis. Ask how the prosthesis is fitting the student, and remind him or her that swelling can occur with increased activity and altitude. A change in fit can cause a decrease in control of the board. Friction can also occur between the limb and the prosthesis. Remind the student to make frequent skin checks of his or her residual limb.

While riding a chairlift, added leg support may be needed to avoid excessive pulling on the prosthesis when the prosthetic leg is supporting or carrying a snowboard. A device known as a knee strap (a 2-inch-wide strap that is adjustable in length) can be connected to both bindings, suspended over the knee, and then connected by a shorter strap or buckle to a waist belt. Connecting the knee strap to the waist belt prevents the strap from falling or getting in the way when the student stands up for unloading and riding. Once the student sits on the chair, the knee strap is pulled over the knee of the lead foot. Such an arrangement evenly distributes the weight of the snowboard over the knee. Alternatively, the student can ride up the chairlift in a "switch" position with the snowboard hanging from the "good" leg.

ASSESSMENT

The following assessments are helpful for choosing equipment and setup (additional information regarding stance and setup can be found elsewhere in this guide, and in the *AASI Snowboard Instructor's Guide*):

- Evaluate balance, range of motion, leg strength, endurance, and physical ability.
- Assess normal stance to see what would work well on a snowboard. (The stance needs to be comfortable and functional for the student.)
- Identify the person's closest point of control for the snowboard.
- How much can the student flex or extend his or her ankle? Knee? Hip?
- Consider hard boots for additional support for the ankle/lower leg.
- Check the student's ability to rotate at the spine, hips, and femurs.
- Assess the student's ability for both toeside and heelside movements. Are both legs equal, or is one leg stronger than the other?
- Assess the student's upper body for range of motion: e.g., the ability to move the shoulder and head in order to face the direction of descent.

COMMUNICATION

Unless other disabilities are present that indicate special communication needs, students with structural or anatomical impairment likely require no modification in your communication approach.

ADAPTIVE EQUIPMENT

The tools that can be helpful here depend on how the student's disability affects his or her upper or lower extremities, or both. For balance and turn initiation, the bamboo pole, ski pole, or outriggers can be helpful. To aid in minimal support, "the dance," the Sno-Wing, Ski Pal, Horse and Buggy, Hula Hoop, or outriggers can be used. When the student's legs are involved, outriggers, a Rider Bar, and/or CADS can be beneficial. These tools can assist the student in standing, standing longer, or giving support to the leg muscles. When both upper and lower extremities are involved, and depending on the degree of involvement, the aforementioned tools may be out of the question, in which case a mono- or bi-ski setup can be the answer.

SAFETY

Special safety needs for students with structural and anatomical impairments include the following:

- Be aware of areas of the student's skin that may have friction conducted to them—e.g., the feet and ankle areas, the end of residual limbs, skin that rests under any brace that may need to be worn on the leg, feet, or arms.
- Increased muscle weakness resulting from increased physical activity, the snow conditions, and the student's level of excitement, so pace the lesson according to your student's needs.
- Many students with structural and anatomical impairments become easily fatigued during lessons, so monitor your student's energy level closely.

Guidelines for Students with a Lower-Extremity Amputation

This section provides guidelines that have proven successful with many snowboard students who have lower-extremity amputations. These guidelines are also useful for students with neurological impairments affecting their lower extremities.

Considerations

- Be aware that a student's stump-and-socket connection can change from morning to afternoon, and that while your student might be perfectly comfortable at the outset of the lesson, he or she could be miserable by lunchtime. Or vice versa, i.e., a student who experiences discomfort with his or her prosthetic at 8 a.m. might have eased into a groove with it by the early afternoon.
    - Advise your student to bring multiple socks to add or remove as the day goes on if the size of his or her stump fluctuates due to water retention or socket pressure.
    - Help the student check stump health at midday; look for rashes, abrasions, and bruising.
- Check the prosthetic for adjustability to help the student create an aligned stance with his or her CM over the middle of the board, with weight evenly distributed over both feet and the hips comfortable over both legs.
- Check and adjust bindings to help the rider achieve an aligned stance.
- If the prosthetic is not adjustable, try adding a heel lift to promote a more upright stance.
- Check for any complications due to changes in bindings or prosthetic. For example, is the stump twisting in the prosthetic's socket?
- Boots need to fit each student's prosthetic, and in order to make such a fit you can add or remove foam to fill space in the boot if no cosmetic cover exists on the prosthetic. This will help create a solid connection between the prosthetic and the boot, which helps transfer movements to the board.

Prosthesis on the Rear Leg, Below the Knee

Students with a below-the-knee (BK) prosthesis often make that the rear leg in their stance because they are then able to weight the front—normal foot—more confidently when making turns. Such a setup can give the student more flexion and extension abilities in the lead leg while allowing the rider to actively steer the tip of the board through turns. Sometimes, however, this stance hinders the student's ability to perform more advanced and complex moves if the flexibility of the prosthetic leg is limited. Some students are able to use the prosthetic leg for skating. Many students with a single-leg amputation prefer this stance.

Twist

- Encourage the rider to flex to toeside using the front ankle and move the knee across the board to draw the hips across to the toeside edge.
- To move to heelside, the rider can drop the front heel to the snow –while keeping the ankle flexed— and be ready to move the hips across to the heelside edge.

Tilt

- On the toeside, the rider can flex the front ankle to drive the front knee toward the snow and bring the hips across to the toeside edge.
- Advise the rider to watch that the front hip joint opens up, allowing the upper body to remain upright (the student should think about moving from a sitting position to one with the hips pushed forward over the toes). On the heelside, it’s important to keep the front ankle flexed, and drop the front heel toward the snow to move the hips laterally across to the heelside edge.
- Tilt can be refined by equalizing weight on both legs and engaging both the front leg and prosthetic knee while flexing or extending the ankles, knees, and hips. Forward lean can be adjusted to promote the desired ankle/knee flex on the front leg.
- Check to see if the rider’s prosthetic walking alignment system can be adjusted to promote a flexed stance.

Pivot

- Strong, sudden rotational movements of the hips may cause the stump to rotate in the socket of the prosthesis. Ideally, the front leg is used to steer the nose of the board to create pivot.

Pressure Distribution

- Coach the rider to flex and extend at the knees to manage pressure on heelside turns. Pressure will be managed through flexion and extension of the ankles, knees, hips, and spine on the toeside.
- Coach the rider to maintain an upright posture on both the toeside and heelside to avoid over-flexing at the waist.
- Fore/aft pressure can be adjusted by independently flexing and extending the legs to shift the CM in the desired direction.
- The rider may show more ability to concentrate weight toward the nose of the board due to greater range of motion in the front ankle.

Flexion/Extension

- Flexion and extension movements will primarily come from the knees, hips, and spine.
- The front ankle will also flex and thus cause the rider’s weight to shift toward the nose of the board.
- Coach equal flex at the knees to keep hips even between the feet and not dominantly over one leg or the other.

Rotation

- Rotational movements will ideally originate from the front leg and be complemented with the hips and rear leg.

Range of Motion

- Encourage the rider to concentrate flexion and extension at the knees and hips in order to provide the greatest range of motion.
- The spine and front ankle can be used as needed.

Timing

- The timing of movements should match the desired turn shape.
- Flexion and extension movements should allow progressive increase and decrease in edging throughout the turn.
    - Encourage more edge during the control/shaping phase of the turn, and less at the start and finish.

Intensity

- Quick, strong rotary movements from the hips and shoulders can cause the board to turn in the opposite direction of the hips and shoulders.
- Deliberate, slow-turning motions at the start of the turn allow the rider to manage turn shape and size.

Duration

- When starting the turn from the hips and shoulders, the rider should allow the lower body and board to catch up (i.e., re-align) with the hips and shoulders at the fall line, and carry through to the finish.
- The movement to create tilt should start at top of the turn, reach its maximum during the control/shaping phase, and then gradually decrease through the finish of the turn.

Prosthesis on the Lead Leg, Below the Knee

Positioning the leg with a below-the-knee prosthesis as the lead leg creates a stance in which the stronger leg is the rear leg. Such a stance increases the student's ability to hop, push, or steer the rear of the board through turns. It also allows the rider to increase pressure on the forward, residual limb and can allow a student to skate more easily on flats.

Twist

- Due to limited range of motion in the front ankle, the rider may use a rotation of the hips in the desired direction to create twist in the board.

Tilt

- Heelside edging can be achieved by flexing both knees.
    - Promote equal balance on both feet.
- Toeside tilt can be achieved by whole-body inclination at higher speeds.
    - The rider should focus on keeping the head up and the upper body upright.
    - Promote opening the hip joint to allow the CM to align over the toe edge.

Pivot

- Too much aggressive rotation of the front femur in the hip socket can cause the stump to rotate in the socket of the prosthetic, thus causing pain or discomfort.

Pressure Distribution

- Due to more range of motion in the back ankle, the rider may tend to keep his or her weight aft.
- Instruct the student to maintain equal flex with both knees and use the front ankle as needed.
- Encourage the rider to flex and extend at the knees to manage pressure on heelside turns.
- Show the student how to manage pressure through flexion and extension of the hips and spine on toeside movement.
- Point out the advantage of an upright torso on the toeside and heelside to alleviate over-flexing at the waist.

Flexion/Extension

- Flexion and extension movements will primarily come from the knees, hips, and spine.
- The back ankle will flex, thus causing the rider's weight to shift aft.
- Encourage the rider to use equal flex at the knees to keep the hips even between the feet, and not dominantly over one leg or the other.

Rotation

- With the prosthesis in front, rotation movements to start a turn can originate in the hips.

Range of Motion

- Help the student find the greatest range of motion from the knees and hips.
    - Suggest that the student add movement from the spine and rear ankle as needed.

Timing

- The timing of movements should match the desired turn shape.
    - Flexion and extension movements should allow a progressive increase and decrease in edging throughout turn.
- Point out the need for more edge during the control/shaping phase, and less at the start and finish.

Intensity

- Quick, strong rotary movements from the hips and shoulders can cause the board to turn in the opposite direction of the hips and shoulders.
    - Deliberate, slow-turning motions at the start of the turn allow the rider to achieve desired turn shape and size.

Duration

- Encourage the rider to begin the turn from the hips and shoulders.
    - You can suggest that the rider allow the lower body and the board to catch up (i.e., re-align) with the hips and shoulders at the fall line in order to carry through to the finish.
- The greatest amount of tilt should occur during the control/shaping phase.
    - The movement to create tilt should start at the top of the turn and reach its maximum during the control/shaping phase.

Above-the-Knee Amputation

A student with an above-the-knee (AK) amputation may have more support when the prosthetic knee is braced in a slightly flexed position. You can use heavy cardboard and duct tape, an Ace™ wrap, or

Velcro™ straps to help hold the prosthesis in a flexed position. The extra effort that goes into holding the prosthesis in a flexed position may eliminate a full range of flexion, which can cause loss of control. Avoid locking a prosthetic knee into a straight position that can be awkward, uncomfortable, and can limit function. Secure the brace setup over the student's prosthesis to create a flexed position.

If the student's prosthetic knee cannot be locked into a flexed position, ask the rider if he or she could use a leg brace with a built-in angle at the knee (this piece of equipment can be used to ensure a fixed, flexed position). Another option is to use a piece of steel rod (e.g., 1/2- or 5/8-inch rebar, depending on the student's size and weight) bent to the desired angle, approximately 10 to 15 degrees. Encase the steel rod in PVC tubing, heavily padded, and secure to the appropriate leg.
A person who has an above-the-knee amputation is a good candidate to try the CADS system (see "Part 2 – Adaptive Equipment" on page 18). The CADS system works without a brace yet provides the same results.

Prosthesis on the Rear Leg, Above the Knee

Twist

- Your student's movement will originate from the ankle.
    - Ask the student to flex to the toeside and move his or her knee across the board to draw the hips in the same direction.
    - For heelside turns, encourage the student to drop the front heel to the snow while keeping his or her ankle flexed and moving his or her hips across the board in the direction of the heelside.

Tilt

- The board can be tipped to the toeside by flexing the front ankle, driving the front knee toward snow, and bringing the hips across to the toeside edge.
    - Advise the rider to watch that the front hip joint opens up, allowing the upper body to remain upright (the student should think about moving from a sitting position to one with the hips pushed forward over the toes).
- Make sure the student keeps the front ankle flexed on the heelside, drops the front heel toward the snow, and moves the hips laterally across to the heel edge.
- Tilt can be refined by equalizing weight on both legs, engaging both the front leg and the prosthetic knee by flexing or extending the ankles, knees, and hips.
- Forward lean can be adjusted to promote desired ankle and/or knee flex on the front leg.
- Be sure to see if the prosthetic can be adjusted and aligned to promote a flexed stance.

Pivot

- Advise the rider to minimize rotation of the upper body by using the front leg to steer the board.
    - Hips should be aligned with the board.
- An overactive upper body is an indication of a stiff lower body, specifically the front ankle and knee, which forces the rider to compensate with upper body movements.
- Help the student learn to pivot, and watch for the unhelpful phenomenon of the stump inadvertently twisting in the socket of the prosthetic. That is, the prosthetic may not "re-set" on its own when the board realigns with the hips.

Pressure Distribution

- The rider can flex and extend the front ankle, knee, and hip to compensate for any lack of flex and extension in the prosthetic.
- Forward lean adjustments in the binding's highback can affect the extension of the front ankle.

    - Coach the rider to compensate for a lack of flex at the ankles with flexion and extension movements at the knee and hip.
- Adjust the prosthetic's walking alignment to help equalize flex of the prosthetic with that of the "good" leg.
- Weight will tend to be forward, with the center of mass lining up over the front leg.
- Promote a balanced stance with equal weight on both feet.

Flexion/Extension

- Generally, flexion and extension movements will come from the front ankle, knee, and hip, as well as the rear hip.
- Adjustments made to the walking alignment system of the prosthetic at the "ankle" and knee joint, as well as any forward-lean adjustments, will affect the ability of the rider to generate flexion and extension.
    - The "ideal" setup would allow the rider to flex and extend comfortably.
    - Promote a balanced stance with equal flex where possible with equal flex in both legs.
    - Flexion and extension promotes control of the board from the closest point of physical ability, which may be the hips or upper body.

Rotation

- Rotational movements will ideally originate from the front leg and be complemented with the hips and rear leg.

Range of Motion

- Due to the prosthetic used, the rider's range of motion may be limited.
- Flexion and extension movements should complement any movements to edge, rotate, or manage pressure.
- Without adequate range of motion in the legs, the student could compensate with gross upper body movements to turn, edge, and balance while riding.
    - Equal weight on both feet will allow the greatest range of motion from both legs.

Timing

- Rotational forces can come from the hips and upper body.
- The rider needs to time the hip/shoulder rotation to start the turn as the board comes across the fall line, having as close to equal pressure on both feet as possible.
- Starting rotation too early can cause the rider to catch the downhill edge of the snowboard or increase speed because he or she is continually pointing the board down the hill.
- Toe-to-heelside turns require similar timing when it comes to rotational movements.

Intensity

- It is important to match movements of the hips and shoulders with the size of the desired turn to lessen the intensity of the reaction from the board.
- Quick, strong rotation of the upper body in one direction can cause the board to turn the opposite direction (i.e., counter-rotation).

Duration

- When turning from the hips and shoulders, the rider should continue to keep the hips lined up with the desired direction of travel (i.e., point the front hip/shoulder across the hill until the rider's legs align with the hips and the board moves across the fall line).

    - It's easier to use lower body movements to steer the board in the same direction as the upper body when slower movements of the upper body are made to prepare to turn (as in "anticipation").
- Edging movements should be progressive and allow the rider to move easily from one edge to the other, promoting maximum edge angle during the control/shaping phase for smoothest transitions.
    - Maximum edge during the finishing phase will require more effort to transition to the new edge.

Prosthesis on the Front Leg, Above the Knee

Twist

- Board "twist" can be created by using the hips to turn in the desired direction.
    - The turn of the hips moves the rider's weight across the board to the new edge, thus causing the board to twist.
    - Twist is beneficial, due primarily to the potential lack of flex at the front ankle and knee as a result of certain prosthetics.

Tilt

- Edging is typically created by whole-body tipping (i.e., inclination) with flex at the front hip and rear ankle on the toeside.
- Heelside tilt will tend to provide more equal alignment and can equal flex in the knees.
- A directional stance (with both feet turned forward) can allow the back knee to move toward the big toe, thus bringing the hips across the board to the toeside.
- Forward lean can be adjusted to promote desired ankle/knee flex on the rear leg.
- Check to see if the student's prosthetic walking alignment system can be adjusted to promote a flexed stance.

Pivot

- Rotation should come from the closest point of physical control to the board (i.e., the hips and/or the upper body).
- The pivot point will tend to be behind the front foot.
- Encourage the rider to flex and extend the rear leg to move the tail of the board.
- Emphasize to the rider the need for equal weight on both legs (as much as the student can bear).

Pressure Distribution

- Pressure is typically managed through flexion and extension; for example, that of the rear leg.
    - A lack of pressure can affect the flexion/extension of the prosthetic.
- Encourage the rider to be aware of the flex of the prosthetic knee, that due to the weight class of the prosthetic it may not allow the equipment enough flex.
- Ideally, look for similar flexion/extension to that of an able-bodied rider.
- Forward lean adjustments can limit extension of the rear ankle.
    - The rider will compensate with greater flexion/extension of the knee and hip.
    - The rider's weight will tend to be aft.
    - Be sure to emphasize the need to have equal weight on both feet.

Flexion/Extension

- Generally, flexion and extension movements will come from the rear ankle, knee, and hip, as well as the front hip.

- Adjustments made to the walking alignment system of the prosthetic at the “ankle” and “knee” joints, as well as adjustments made to the highback forward lean, will affect the ability of the rider to flex and extend comfortably.
- Be sure to encourage a balanced stance.
- Promote control of the board from the closest point of physical ability (e.g., hips and/or the upper body).

Rotation

- Rotation of the front leg may be possible; if not, encourage rotation of the hips to aid turning.

Range of Motion

- The student’s range of motion may depend upon his or her prosthetic equipment.
- Flexion and extension movements should complement any movements related to edging, rotation, or the management of pressure.
- Without adequate range of motion in the legs, the rider may try to compensate with gross upper body movements to turn, edge, and balance while riding.
- Promote a balanced stance, with equal weight on both feet in order to allow the greatest range of motion in both legs.

Timing

- Because rotational forces will likely start in the hips and upper body, the timing of these movements is critical.
- For a turn from heels to toes, the rider needs to time the hip/shoulder rotation to begin the turn as the board comes across the fall line. The rotation should also commence when he or she is as close to having equal pressure on both feet as possible.
    - Starting rotation too early can cause the rider to catch the downhill edge of the snowboard or increase speed because he or she is continually pointing the board down the hill.
- Toe-to-heelside turns require similar timing of rotational movements.

Intensity

- It’s important to match movements of the hips and shoulders with the size of the desired turn to lessen the intensity of the reaction from the board.
- Strong rotation of the upper body in one direction can cause the board to turn the opposite direction (i.e., counter-rotation).
- It’s easier to use lower body movements to steer the board in the same direction as the upper body when slower movements of the upper body are made to prepare to turn (as in “anticipation”).

Duration

- If rotation is from the hips and/or shoulders:
    - Coach the rider to begin the turning motions before the edge change, and continue steering the hip/shoulders until the board moves across the hill (e.g., point the front hip at the trees on the side of the run).
    - Speed control is achieved through turn shape.
    - Heel- and toeside turns should be similar.
    - Using a directional stance—positive angles on both bindings—can aid turn shape, especially if there is play between the stump and prosthetic socket.
    - Edging movements should be progressive and allow the rider to move easily from one edge to the other in order to:

- Promote maximum edge angle during the control/shaping phase for smoothest transitions.
- Produce maximum edging during the finishing phase, which will require that the rider use more effort to transition to the new edge.

Bilateral Below-the-Knee Amputation

Working with students with bilateral below-the-knee (BK) amputations (i.e., both legs amputated below the knee) requires special consideration of whether to ride using the prostheses or not. Due to the pressures exerted between the residual limbs and the prostheses, take time to assess what the best approach might be for each student. Take, for example, the case of a student with bilateral below-the-knee amputations who found that it was easier to ride without his prostheses than with them. He accomplished this by putting his residual limbs into the snowboard boots (in place of feet). One of the biggest challenges with this new arrangement was the need to use adequate padding to fit and protect his limbs. The setup gave the student a better feel for the movement of the snowboard and improved balance. He found that his hands worked well as a means of resistance to pivot the board.

Twist

- The rider will turn from the hips and shoulders.
  - Shifting weight across board will cause a twist in the board.
- Encourage the rider to use slow, smooth movements.

Tilt

- Encourage flexion of the knees and an upright torso on the heelside.
  - Such movement will allow more refined edge control and adjustment during a heelside turn.
- On the toeside, the rider can use whole-body tipping (i.e., inclination) to create edging.
  - Watch for head movement too far inside, due to breaking at the waist).

Pivot

- A rider's hips and shoulders can be the primary turning force.
  - Due to flexion at the knees, it may be possible to coach the rotation of the legs to generate turning forces.
- Rotation of the front femur in the hip socket can help steer toe-to-heel turns.
- Heel-to-toe action can require that the rider turn the hips and shoulders to steer board.

Pressure Distribution

- Pressure should be managed by flexing the knees, hips, and spine on the heelside.
- Pressure on the toeside will be managed through flexion at the hips and spine.
  - Coach the rider to extend the legs equally.
- Encourage the student to ride with his or her torso upright.
- Ask the student to use leg extension and flexion to shift weight fore or aft as needed.

Flexion/Extension

- Because knees allow flex, encourage the student to flex the knees and hips as a primary means of managing pressure vertically.
- Fore-aft pressure can be shifted by flexing and extending the legs independently to shift weight in the desired direction.

Rotation

- Rotation can come from the front femur in the hip socket or from the hips as needed.

Range of Motion
- The hips and spine will show the greatest range of motion.

Timing
- The timing of the student's movements should match the desired turn shape.
- Flexion and extension movements should allow a progressive increase and decrease in edging throughout turn.
- Encourage the rider to apply more edge during the control/shaping phase, with less at the start and finish.

Intensity
- Quick, strong rotary movements from the hips and shoulders can cause the board to turn in the opposite direction than that of the hips and shoulders.
- Deliberate, slow-turning motions at the start of the turn allow the rider to create a turn with the desired shape and size.

Duration
- When starting a turn from hips and shoulders, coach the rider to allow the lower body and board to catch up (i.e., re-align) with the hips and shoulders at the fall line and carry through to the finish.
- The greatest amount of tilt should occur during the control/shaping phase
    - Movement to create tilt should start at top of turn and reach maximum during the control/shaping phase.

Bilateral Above-the-Knee Amputation

Twist
- With turns initiated from the hips and shoulders, shifting weight across the board will cause a twist in the board.

Tilt
- Tilt will typically come from the rider tipping the entire body (i.e., inclination) on the toeside.
- Heelside tilt will demonstrate flex at the hips, but it may produce minimal flex at the knees and ankles.
- During tilt, the upper body is used to maintain balance.
- Tilt promotes smooth, progressive edging movements throughout the turn.

Pivot
- The hips and shoulders will tend to be the primary rotary force during a pivot.
- Encourage the rider to use smooth turning motions to move from edge to edge.

Pressure Distribution
- Flexing the hips and spine is the primary means of managing pressure vertically.
- Tip-to-tail pressure adjustment may be possible by shifting the hips toward the desired end of the board.
- While the student is pressuring the board, be sure to watch for the amount of flex and extension in his or her prosthetic legs.
    - Too much pressure build-up can cause sudden release (i.e., extension) of prosthetic joints, which can result in a loss of balance and pressure on an edge.

Flexion/Extension
- Flexing the hips and spine is the primary means of managing pressure vertically.
- Fore/aft pressure can be managed by shifting the hips toward the tip or tail of the board.

Rotation
- Rotation movements will come from the hips and shoulders.

Range of Motion
- The hips and spine will show greatest range of motion when riding.

Timing
- The timing of movements can match the desired turn shape.
- Flexion and extension movements can allow a progressive increase and decrease in edging throughout the turn.
    - Coach the rider to apply more edge during the control/shaping phase, with less at the start and finish.

Intensity
- Quick, strong rotary movements from the hips and shoulders can cause the board to turn in the opposite direction of the hips and shoulders.
- Deliberate, slow-turning motions at the start of the turn allow the rider to produce a turn with the desired shape and size.

Duration
- Rotary movements into the new turn begin from the hips and shoulders, and the lower body should catch up by the time the board is coming out of the fall line into the completion phase of the turn.
- Duration helps the rider's lower body and board catch up (i.e., re-align) with the hips and shoulders at the fall line. Such an alignment will carry the rider through to the finish.
- The greatest amount of tilt should occur during the control/shaping phase.
- Movement to create the tilt should start at the top of the turn and reach its maximum during the control/shaping phase.

Muscle Weakness and Balance Impairments

Twist
- Identify the rider's closest point of physical control relative to the board, and coach movements to control the board from this point.
- Twist can be created by hip/shoulder rotation.
- If using a Rider Bar, ask the student to use his or her arms to pull the front arm close and extend the back arm to generate twist.

Tilt
- In general, the entire body will be used to create edging (i.e., inclination).
- Some articulation may be possible in the rider's midsection to allow the upper body to remain upright when tilting the board.

Pivot
- Encourage the rider to use the upper body, hips, and shoulders for rotational movements created by pivot.
- Ideally, the hips and shoulders will be evenly balanced between the feet to prevent sudden weight shifts to the fore or aft.

Pressure Distribution

- Pressure management from flexion and extension of the legs may not be present.
    - Use flexion and extension of the hips and spine when possible.

Flexion/Extension

- Identify where in the body the rider may be able to use flexion and extension.
    - Coach the rider to use these body parts to manage pressure, edging, and rotation.

Rotation

- Identify the closest point of physical control for each student, and coach rotational movements from this point to control the board.

Range of Motion

- Identify the range of motion for flexion and extension and rotary movements for each student, coaching them to explore the full range as needed.

Timing

- The timing of the movements should match the desired turn shape.
- Flexion and extension movements should allow a progressive increase and decrease in edging throughout the turn.
- Encourage the rider to apply more edge during the control/shaping phase, with less at the start and finish.

Intensity

- Quick, strong rotary movements from the hips and shoulders can cause the board to turn in the opposite direction from that of the hips and shoulders.
- Deliberate, slow-turning motions at the start of the turn allow the rider to achieve the desired turn shape and size.

Duration

- Coach the rider to start the turn from the hips and shoulders.
    - Encourage the rider to allow the lower body and board to catch up (realign) with the hips and shoulders at the fall line, and carry through to the finish.
- Movement to create tilt should start at the top of a turn with the greatest amount of tilt occurring during the control/shaping phase.

Stance

- The goal is to establish a stance in which the rider can balance the CM over the middle of the board as it moves from edge to edge and between the feet, as the rider maintains equal weight on both feet.
- Double check the rider's board setup before you head out onto the snow.
- As part of the assessment, watch the student's natural walking stance for foot angles.
    - Double check foot alignment in a standing position.
- Set up the bindings to allow a comfortable standing position with the binding angles set similar to their natural walking and standing foot angles.

Other Common Disabilities

ARTHRITIS

Arthritis is an inflammation of the joints that can occur in various forms and can affect people of all ages. Special needs of arthritis sufferers are determined by how the disease affects the individual. Slam-free teaching tactics are critical for these students. Setting up the student in a comfortable and functional stance will help improve balance. Outrigger(s), bamboo poles, ski poles, and holding hands or "the dance" are useful balance supports.

CEREBRAL PALSY

Students who have cerebral palsy (CP) can snowboard, but be aware that no two CP students are the same. Students can be affected physically and/or cognitively, with symptoms ranging from almost unnoticeable to severe. Many students with CP are cognitively unimpaired, yet their speech may be difficult to understand and/or they may need extra time to process questions you pose. In addition, they may walk without a noticeable wobble, use one or two crutches, or use a manual or powered wheelchair. Fatigue and over-worked muscles can increase or induce muscular weakness in students with CP.

Cerebral palsy is classified into three categories:

1. Ataxic-Jerky – People in this category may exhibit uncontrolled movements that cause the person to appear clumsy or uncoordinated. Muscle tone is normal, yet balance is severely affected.
2. Athetoid-Involuntary – People with this type of CP can exhibit jelly-like, purposeless movements of the extremities or trunk. Movements related to this category are described as extraneous or uncontrolled, and the person is often unable to direct precise motor function. Muscle tone may vary.
3. Spastic-Increased – This type of CP can affect muscle tone, which may in turn affect a single limb, one side of the body (spastic hemiplegia), both legs (spastic diplegia), or both arms and legs (spastic quadriplegia). Muscles are usually tense and flexed. This is the most common type of cerebral palsy.

A student with CP may assume or even require using an unusual stance. The instructor should work with the student to determine the stance that is most comfortable and makes the best use of available movement. The degree of fine motor control will also come into play when selecting the boot/binding system. Some systems are much easier to use independently for students who have difficulty with fine motor control.

Some CP students may wear a leg brace or ankle-foot orthotics (AFO). These devices typically need to be worn while riding. The student, family member, or caregiver can help describe the usage of each device. Some students may require a snowboard boot that is a size larger than their usual shoe size in order to accommodate their braces or AFOs.

POST-POLIO

Post-polio students may have weaker and/or shorter extremities. The affected extremity (in most cases it will be one or both legs) may have a loss of muscle tone and strength. It is common for these students to wear a brace, and in most cases the brace should be worn while riding.

For students with a leg-length discrepancy, the length difference can be evened out with a shim or lift that is placed in the boot between the boot and its binding, or between the binding and the board. When adding shims, a good rule of thumb is that a little goes a long way and that the desired effect can frequently be achieved with a shim that is less than the length of the student's leg length discrepancy.

Outriggers are the most common type of equipment for aiding balance when there is weakness in one or both legs. Lesson pacing is important to prevent muscle fatigue since overworking the affected muscles can increase weakness and muscle pain.

Combinations of Disabilities

Students who have a combination of disabilities typically fit into two or more of the previous profiles, and many have learned to snowboard. The instructor of such a student needs to assess all impairments fully, both on their own as well as in terms of the combined impact of the impairments. It is especially important to learn what other activities the student participates in, how he or she tolerates activity, and for how long. Determine a lesson plan once impairments have been fully evaluated.

EXAMPLES

One example of a student with a combination of disabilities is an individual who has diabetes and, as a result of the disease, has had a foot amputated and is now losing his or her eyesight. Diabetes caused both the amputation and visual impairment, and as a result the instructor will need to assess the student's visual field as well as his or her strength and the impact of their amputation and foot prosthesis.

Another example would be students with CHARGE Syndrome (a distinguishable pattern of birth defects) who may have peripheral vision in only one eye, loss of hearing, and poor muscle tone. The instructor will need to assess the student's visual field, figure out a working method of communication, and determine muscular strength and stamina—and from all of this information must be able to create a system of instruction that works for guiding such an individual on the snow.

Yet another example of a combination of disabilities is a student who has sustained a head injury in an accident and has hemiplegia, or paralysis, of an arm and leg on one side of the body. Such a student might also have difficulty articulating his or her thoughts. The instructor will need to assess the physical strength of all limbs, static and dynamic balance, and gait if the student is walking. Does the student use a cane, crutch, or wheelchair? Once the student has been evaluated on a physical basis, it will be helpful to evaluate his or her cognitive abilities. Can he or she put sequential steps together, follow instructions, and understand the instructor? Finally, determine how best to communicate with such a student.

Chapter 6: Student Scenarios

The following scenarios are based on actual instructor experiences. They highlight disabilities presented by students, the goal-setting process, and the equipment used. Ideas and understanding can be gained from each. It is important to realize that not all students will present the exact challenges seen here.

Rider Scenario #1 (Visual Impairment)

Antonia, age 17, is a totally blind advanced-level alpine skier who also water skis in the summer. She is from Italy and speaks no English. Antonia's senses of hearing and feeling are very strong. With the help of an interpreter, the instructor and Antonia shared and learned several words in both English and Italian to allow for communication and a safe lesson. The shared words referred to body position and terrain as they relate to snowboarding and included "stop," "toe,"" neutral," " heel," "hold," and "turn."

Antonia first worked on her stance, as well as toeside and heelside movements indoors. She then repeated them statically on the snow prior to sliding. The instructor was on skis and worked with Antonia by using the holding hands, or "dance" technique. Antonia had great balance and easily learned the toeside, neutral, and heelside moves. She quickly advanced to basic turns.

Initially, the pair stayed in contact as Antonia held onto the instructor. She started to let go as she acquired a feel for the board. A trusting relationship developed and Antonia let go long enough to link a few turns independently with the instructor close by. After that, Antonia progressed quickly to riding the chairlift.

At this point she started to feel what was needed for each turn and no longer held onto her instructor. She fell several times, but learned to get up and start to ride again. By the third run, Antonia could link 6 to 12 turns. Her energy level, understanding, and feeling for the board made it possible for her to ride easy greens within two hours.

This student scenario is an example of a progression that follows the leapfrog approach, in which certain aspects of the progression are bypassed to fit the needs and goals of the student. Students who are suited to this approach are usually highly active and engage in other activities that have movement patterns similar to those of snowboarding.

Rider Scenario #2 (Cognitive Impairment)

On a cool, snowy day, a group of never-ever snowboarders began their lesson and started to get to know each other. The class of older teens and college freshmen included Henry, who, at age 28, was a bit older but fit with this class better than with older adults. Henry's family often skied together, and his two younger siblings had snowboarded for the past three seasons. Henry wanted to give it a try too. Henry has Down syndrome, lives at home with his parents and siblings, and has a day job at the local resource center.

Henry's parents and siblings dropped him off for class. It was the first day of the season and everyone in the family was taking a lesson. Henry's parents said that he was not taking any medications, and he could follow simple steps if presented one at a time. They reported that an x-ray taken some years previous showed no problems with atlantoaxial instability in his neck. Because his eyesight wasn't great, Henry wore glasses.

As Henry walked around and waited for class to begin, the instructor noticed that his toes pointed slightly outward, away from his body in a duck position. With this knowledge, the instructor adjusted Henry's binding stance to -6 and +6, with Henry's right foot in the lead. This "goofy foot" position was

selected because Henry talked about playing soccer and showed how he could kick the ball with his left foot. There were some other soccer players in the group, too, and this led to some great stories that helped bring the group together. Cheryl, a participant in the group, shared that her brother has Down syndrome. Henry and Cheryl became a pair as they helped each other, and their friendship continued to build as the lesson progressed.

Henry had difficulty walking and skating with the front foot in the binding and the rear foot pushing. As the group practiced this, Henry practiced walking in the snow along with the group while holding his board, "looking like a cool dude." For climbing, Henry showed how he would climb a gentle hill if he were skiing. Then he showed how he would edge his board in the snow in the future when he was ready to climb on a snowboard.

Moving onto a very gentle straight run with a natural stop at the end, the group started a quarter of the way up a knoll. At first, they had one foot out of the binding. Almost everyone wanted or needed the instructor to be next to them for their first slide. Everyone's focus was working on stance and looking down the hill. Henry had the group laughing with the jokes he told and the group cheered as everyone gradually rode down a little more of the knoll each time. By lunchtime, everyone was either "King" or "Queen" of the knoll, determined by riding down the knoll without assistance, having both feet in the bindings, and achieving some directional changes—whether on purpose or not.

Then the group played "What are we doing?" The question was asked of the person heading down the knoll and that person had to respond by reciting a rule from Your Responsibility Code. If the same code was said twice in a row, the student had to say two of the codes next time.

After lunch the group returned to the knoll by group decision and continued to gain "ownership" of the task at hand, making directional changes. Once everyone accomplished this, they rode the chairlift for a run on the beginner slope. Everyone had the choice to walk on and off the chair, carrying their board or riding the lift with their snowboard on. The instructor went to the top to assist by calling out reminders and making sure the lift was slowed down. Cheryl and Henry rode up together, holding their boards the first time.

The big step to the beginner hill provided more terrain with which to work on heel and toe exercises. When the terrain is too flat, it's harder to gain the feeling of the edge and easier to catch an edge and fall. The group worked on garlands and falling leafs. On part of the hill, they worked as a group and then practiced independently. Everyone watched each other and cheered if classmates did well or even when they fell.

Toward the bottom of the run, it flattened out and was a perfect place to practice flat-spin 180s and 360s. By doing this they learned how to feel a flat board and avoid the edges, pressuring the board in different areas and pivoting. It was a great way to have fun and learn at the same time.

On the last run of the day, Henry started walking and skating with his board while in line. Henry still chose to carry his board while riding the lift, as did a few others. On this last run, the class returned to garlands and falling leafs to improve these skills. The students were paired up with one person following his or her partner. When some individuals "follow the leader," they don't think as much and the moves become easier. At the bottom, they made the choice to work on their 'spins' (i.e., 360s or 180s).

This was the first day of a three-day lesson. In summarizing the lesson and preparing them for tomorrow, the group was told that they would work on full turns in the morning on the same trail and

try some ollies or nollies. As with any lesson, it's important to provide a review of the lesson experience and preview what can be expected when the student returns.

Rider Scenario #3 (Neurological Impairment)

Brian is a 16-year-old student with an incomplete spinal cord injury at level C1/C2. He had sustained his injury while snowboarding and was eager to ride again.

Brian uses a wheelchair and has virtually no fine motor control. He regularly attends therapy sessions and works on strengthening his body. His doctors have indicated that if he keeps working, there is a good chance that he will regain more movement, coordination, and strength over time.

When Brian first rolled in he wanted to know what his options were for snowboarding. After being introduced to his instructor and another who would assist in the lesson, Brian was tested for balance, range of motion, endurance, etc. After a thorough evaluation and assessment it was determined that he was still very weak but currently could stand for approximately 10 to 15 minutes. In that time span he could take approximately 20 steps using a swing-through gait with a walker. His right side—especially his right hand, wrist, and forearm—were slightly weaker than his left side. His attitude was inquisitive, robust, and determined. The assessment revealed two strong equipment options; a snowboard equipped with a Rider Bar (a short-term, stand-up approach) or a bi-ski (a long-term, sit-down alternative).

When asked which option he would prefer, he chose both. It was determined and agreed upon that if Brian could stand and play on the Rider Bar on snow for 10 minutes, the experience would be considered successful. His instructor chose to try the Rider Bar option first in order to optimize Brian's early morning strength and endurance.

This brought the lesson into beginning goals and plans. The basic starting plan was to experiment and play with the Rider Bar in order to discover and exploit options in the morning, and then in the afternoon session do the same with the bi-ski.

Brian was then fitted with snowboard boots. The right boot was one size larger to accommodate his ankle foot orthotic (AFO). The Rider Bar was set up as close as possible beforehand in order to optimize actual time standing up in the Rider Bar. The assessment had revealed that Brian had been an accomplished snowboarder who rode regular, and his most comfortable stance ended up being +9, -9. This position also promoted switch riding, per Brian's goals.

The U-bar on the Rider Bar was raised and angled to allow Brian's forearm to be perpendicular to the upper arm and the elbows slightly in front of the hips. The horizontal adjustment of the U-bar was loosened ever-so-slightly to allow for independent twisting of the board, resulting in easier engagement and disengagement of the leading edge, especially at turn initiation. During setup Brian sat and asked questions about the sizing adjustments.

Brian and his team were now just about ready to rock and roll. Before going out onto the snow they reviewed what Brian remembered about basic riding and board performance, combining that information with a brief discussion of Rider Bar function and application of balancing movements. They next covered how Brian could affect steering by gently pulling or pressing (pushing) the lead end of the U-bar. Brian was then wheeled out onto the snow, ready to go.

The following is an approximate sequence of how the first session went:

60 seconds: Brian stood up, stepped in, and strapped in (with assistance). The Rider Bar height was okay, so his instructor and assistant made a quick adjustment of angle for comfort, all with team-like precision.

30 seconds: The instructor lightly wrapped a 2 x16-inch Velcro elastic strap around Brian's right hand and the bar to help his weaker hand grip the bar.

60 seconds: Next, the instruction team pushed and/or pulled Brian across the flats—approximately 30 feet each way—while lightly supporting him (to keep him from falling). Brian remembered sliding. The instructor assessed the snow conditions while observing Brian's balance. Checking in with Brian to make sure everything was okay, the team moved on.

45 seconds: Time to use gravity. Fortunately, the adaptive program had two Rider Bars so the assistant was able to give two quick demos. Determining that the starting point of the demo might have made Brian's first attempt at sliding too far and too fast, the instructor adjusted the starting point accordingly. The subsequent coaching for Brian was simple: Stand up, look in the direction of travel, balance, and don't do anything else . . . just slide.

45 seconds: Team Brian worked on sliding approximately 10 to 12 feet to a natural stop in a runout zone. They pushed Brian up the slight incline, turned the nose of the board downhill, paused for moment, and offered this quick review: "Stay in a tall-yet-slightly-flexed stance, turn your head to look in the direction of travel, take a deep breath, relax, and go." The first focus was to not let him fall. Brian rode about 13 feet to a natural stop—with one minor balance correction—all with a combined look of horror, anticipation, and relief. His position was toward the tail of his board, so the instructor suggested he increase flexion in his lead leg to help move his weight forward.

30 seconds: Brian repeated the straight run in better balance. All was A-OK. Team Brian asked if he'd like to go again. "Yes!," he said, this time with a big smile.

30 seconds: The team took a break, with a discussion:
"Fun?"
"Yes."
"Scared?"
"Yes."
"Beautiful day? "
"Yes!" followed by a breath and "Okay, let's go!"

30 seconds: The team repeated the previous steps but with a starting point two feet higher up than the original start. Despite a slight bobble, Brian rode approximately 15 to 16 feet with a grin from ear to ear.

30 seconds: The group repeated the steps from a higher start. Total success.
"Hey, do you want to try switch" asked the instructor.
"Sure."

Going back to the original, lower start, Team Brian took time to re-set—this time putting the weak side forward and giving Brian some extra time to process the new direction. He didn't fall, but his right shoulder dipped, causing some twisting and slight imbalance.

45 seconds: Brian gave it another go, with better results but a lot more effort. His instructor suggested they go back to regular riding, but added: "Do you want to try something new?"

" Sure," came Brian's eager reply.

5 minutes: Brian's instructional crew took a break, pulled up his wheelchair, and let Brian sit down and rest while still rigged up.

60 seconds: This time the instructor asked Brian to ride regular but look over his left shoulder approximately 25 to 30 feet and gently pull the front of the horizontal bar with his left hand as he started moving. Brian had a good, soft touch and performed quite well. At the bottom of the hill Team Brian showed him how the board had deflected about 3 feet to 4 feet in about 12 feet of travel. The congratulated him with a chorus of "Nice heelside turn, dude!"

30 seconds: Tactics were repeated as before with about "2 more ounces" of pressure applied to the pull and a focus on balancing a little more over the heelside edge. Brian had an excellent run with 4 to 5 feet of deflection in 11 feet.

"Do you want to try a couple of toeside turns?" asked the instructor.

"Yes."

60 seconds: After a brief explanation of "This time when you start moving, gently press or push the bar away from you while balancing more over your toeside edge," Brian looked up to see 2 feet of deflection in 12 feet of travel. Good stuff.

30 seconds: One more toeside turn. This time was much smoother, with 3 feet of deflection in 12 feet of travel. The only problem now was that Brian's face was cramping from smiling too much. His legs were getting tired but Brian had enough stamina for one or two more runs.

60 seconds: The time had come to try a linked turn. The instructor offered a brief explanation: "Start with a heelside turn and as soon as you begin moving, go to neutral, then to toeside."

At the bottom, the instructor quickly got Brian's chair since his legs were giving out. Once in the chair the team looked at Brian's last run: 1 foot of deflection on the heelside and 2 feet of deflection on the toeside. A linked turn!

So far, Brian had made two flat runs, four straight runs, two switch runs, two heelside turns, two toeside turns, and one linked turn. This was Brian's beginning morning session. Exhausted, he went to lunch beaming with success.

After lunch, his instruction crew brought out a Bi-Unique bi-ski and showed him the similarities between carving a snowboard and carving the two short, shaped skis under this sit-down apparatus. Because of Brian's overall weakness and exhaustion from the morning session, he was not yet able to fully balance with handheld outriggers. His introduction to bi-skiing would be thanks to a tethered, fixed-outrigger setup, with a single handheld outrigger in his left hand. Fixed riggers would give him lateral stability while he became familiar with the handheld rigger. Brian was excited and liked this option because he wouldn't have to work as hard. It would allow him to cruise more of the mountain at a higher rate of speed.

Team Brian had him sit in the bi-ski while they fitted him with a handheld outrigger for his left hand. This would allow him to take a more active role in balancing and turning. They also attached the fixed outriggers, since his right hand was not strong or coordinated enough to hold an outrigger. Brian's stamina would not yet allow him to be outside more than 1 to 1.5 hours, so his crew worked inside on balance drills and the movements needed while sitting in the equipment. Once Brian and company

moved outside, they skipped the flatland drills and went up the chairlift (full instructor assist for the load and unload) to a wide-open green trail.

Brian was a pretty accomplished rider before his accident, and it took him only one run with a full seat assist to figure out basic balance and weight shift for turning. His center of mass in the bi-ski was so low to the snow that he was able to balance by using his body and, occasionally, his left outrigger. He was able to engage the outrigger brakes, but preferred to carve it up, using turns to control his speed. As a safety measure, his instructor and the assistant kept the tethers with a safety strap on his bi-ski during all his runs, since the fixed outriggers prevented him from falling over and stopping, even if he'd wanted to.

During Brian's first venture back into snowboarding—stand-up and sit-down—he didn't go very far but he accomplished a lot. He rode standing up, when he first wasn't sure he would ever snowboard again. He left hopeful, encouraged, and determined. He ended up coming back several times that year, following the established pattern with progressive results. By springtime he was able to do two full laps while using the Rider Bar (assisted) on the beginner run with a break.

Brian came back the following year stronger than ever and he could now stand for approximately 45 minutes to an hour without a break. He was always assisted while using the Rider Bar, and began to ask if he could ever be independent. Team Brian described a single-outrigger technique in which the rigger would be in the lead hand (i.e., his left hand while riding in a regular stance). Using an outrigger in the lead hand with his right hand on the Rider Bar could lead to Brian being able to ride independently. To promote an easier and more natural hand position, his instructor drilled a hole in the lower outrigger at a 45-degree angle to the existing holes. This turned the outrigger ski 45 degrees from the outrigger handle. Brian loved this, making it easier to use the outrigger while snowboarding.

His team introduced the outrigger progression by showing him how to gently let go of the Rider Bar with his left hand and use it to point in the direction of the turn. After a lot of mileage, they gave him an outrigger to play with, using a crossover (outrigger in front) method. The long-term goal of this progression might be to ride independently with the Rider Bar and single outrigger. An extended progression from this point might include a transition to a double outrigger technique without the Rider Bar. This would require increased functional core and shoulder strength, thus permitting outrigger stability.

On his return visits Brian was also able to use a handheld outrigger on his right hand, as long as it was secured with Velcro to his wrist and forearm. His team next introduced Brian to a specific technique referred to as "drop and block." The primary difference or variance from the standard outrigger setup is a shorter outrigger, which are used as a technique for mono- and bi-skiers who may have either diminished upper body strength or severe balance issues. Outriggers may increase in length as needed with skill development, if desired.

Soon after Brian was comfortable using handheld outriggers in both hands, his team got rid of the fixed outriggers. When Brian's turns had speed control he graduated to riding off tether. His instructor showed his family how they could assist him with chairlift loads when his arms got tired, and perform seat assists across flat terrain to help him become more independent when riding in the bi-ski. For Brian, this was a great way to get back on the mountain, even though his body never fully recovered from his spinal cord injury.

Rider Scenario #4 (Structural and Anatomical Impairment)

The following scenario focuses on a student who has had amputations to one of her legs. When setting up equipment, the stance is individualized for students with disabilities just as it is individualized for able-bodied students. In the past, students weren't always give a choice of which foot was in front. Ultimately, consider comfort level, goals, and the rider's preferences when setting up their stance.

Carin is a 19-year-old with an AK amputation. She skis on one ski and two outriggers (known as three tracking) and has been racing successfully for two years. Carin happened upon an ASB clinic and said, "I wish I could snowboard!" When asked, "Why don't you?" she said, "Because I'm an AK, and I didn't think AK's could ride." To her delight, she was told that she could and was shown the padded and angled rebar setup that could be used to brace and stabilize her flexed prosthesis.

Carin was a racer with a high level of athletic ability, full knowledge of skiing and edge control, and the ability to use outriggers. Because of this, the introduction of riggers and usage was leapfrogged. Her instructor substituted Carin's race outriggers with outriggers that had brakes for stabilizing purposes, so she had a platform with which to catch herself for balance or to push off of for realignment.

The rebar setup was Ace-bandaged onto the prosthetic leg. While flexing this leg, the rebar slipped forward so it was realigned and secured in place with duct tape.

Once outside, she and her instructor started in an area with a small incline and run-out zone. Starting with stance and body alignment exercises while looking ahead, Carin glided for 20 feet and came to a natural stop. Everyone was cheering. On the same run-out, her instructor encouraged her to look over her shoulder and keep her balance over the heelside edge, resulting in a slight heelside turn. Then she worked on balancing over the toeside edge, producing a great toeside turn. Her knowledge of skiing was transferred to the snowboard.

Since the next step up in lift-served terrain was a long run that started with a blue pitch, leapfrogging through the basic snowboard progression was necessary. At the top of the lift, the instructor set the brakes up for stability and explained the next step. For the blue slope (about 100 yards), Carin did four heelside falling leaf traverses with the outriggers in the crutch position. Next she spun around to the toeside after a brief explanation, description, and demo. She did four toeside falling leaf traverses. She had no falls as of this point.

By then she and her instructor were down to steeper green terrain. After a brief explanation and demo, Carin did a heelside turn to a stop, followed by a series of garlands. The duo turned to the opposite direction. After another explanation and demo, she made a toeside turn to a stop, followed by another four garlands. As the terrain had eased to an easy green, Carin was able to accomplish a heel-neutral - toe -inked turn after an explanation and demo.

Exhilarated, full of excitement, and breathless, Carin took a breather before heading to the bottom of the hill, a run of approximately 200 yards. She took off and linked about 20 turns in the last 100 yards. The instructor only needed to make an occasional fine-tuning comment as Carin explored and experimented with outriggers and board usage. At one point, Carin got her weight too far over the nose of the board, over-rotated, and did a slow spin-out to an easy fall (her first). She was laughing while getting up. She and her instructor had a small refinement discussion about having a quiet upper body and riding centered and balanced between her feet. Soon she was off again, making gleeful linked turns all the way down to the lift, including down the last steep pitch. The elapsed time for the mile-long run was 50 minutes.

In jubilation (and every other elated descriptor you can imagine), the first words out of her mouth were "Can we go again?"

Carin made two more runs, 35 minutes each. She used her outriggers and rode independent of an instructor. Her total time out riding was 2 hours. Carin wanted more time, but the lifts were closed for the day. Her day ended on a high note, though. At the bottom, she proudly picked up her board, walked over to her cheering friends, and said "I'm a snowboarder!"

Rider Scenario #5 (Combination of Impairments)

At the age of 30, John sustained a traumatic brain injury in a car accident. He was left with right-side hemiplegia and difficulty articulating thoughts. John had not experienced snowsports activities before his accident, and for six years afterward had tried skiing, with little success. Before the injury, John had skate boarded and liked speed. His dream was to snowboard.

Physically, John's left side was strong and he did weightlifting and body-building. His right leg was hypertonic, but could bear weight. Flexion, extension, and fine motor movements were diminished and his movements were jerky. John relied on his left side to help maintain his balance.

John was not aware of the sequential steps that are necessary to accomplish snowboarding, but he was determined, positive, aggressive, and independent in pursuing his dream. He is fearless and often unaware of the dangers of speed and impact. Through extensive groundwork, John came to comprehend the process necessary to achieve his desired outcome. It has proven to be rewarding, although it has not been easy.

It took many tries to find a setup that was comfortable and effective for John. After some trial-and-error, soft freestyle boots seemed to fit best and were not too difficult to walk in. The stance took even more experimentation. John's final stance position is +15 for his lead foot and -3 for his rear foot, an 18-degree split.

Minimal time was spent on pushing, skating, and toeside/heel side drills due to the weakness of John's right side. The first straight run was accomplished using a modified dance position. The instructor, on skis, rode parallel to John and provided a stable support. Unfortunately, the initial terrain did not have a natural stopping point. After a few trials, the team received help to locate better terrain. "Bowl shaped" terrain in the beginner area provided an excellent location for John to slide forward, look in the reverse direction, and then ride switch back to the original side with the assistance of the instructor. It allowed John to work on feeling balance and improving his toe- and heelside moves. This is a good example of leapfrogging part of the progression while detailing other parts.

On the second day, John's instructor introduced the use of an outrigger, since John was so eager to be independent. He refused to use the outrigger initially, but after some initial struggles and frequent falls, he decided to give the outrigger a try. John was instructed how to use the single outrigger with his left arm. Initially, his turns were slow and had little shape. He could not control his speed. For safety, a tether was attached with a snowboard clamp, to help John initiate turns and maintain speed control.

After he gained a sense of basic balance, directional change, and speed control with the assistance of his instructor, John was deemed ready to ride the chairlift. The lift was stopped on the first few chairlift rides to allow student and instructor to develop a loading and unloading procedure. The chairlift brought the pair to a beginner slope that offered gentle terrain for turning and longer practice runs.

Tethering allowed turns to happen in slow motion as the instructor talked John through the turns. His instructor verbalized the heel release, going to a flat board (neutral), and moving to the toe edge. The timing created with each turn allowed the turns to be linked at a comfortable speed. Repetition enhanced learning, without adding any new information that could cause confusion.

John has enjoyed good success even though his snowboarding is limited to a few days per year. Each meeting starts with a review of experiences from previous years. By the fifth year, John could ride independently on green terrain, with the use of one outrigger. He was able to make 8 to 12 linked turns before he'd fall or need to reassess his position. Tethering is still used in narrow, crowded, or steep situations. There have been only a few setbacks along the way and a better unloading technique is still needed. The Swivler (discussed in this guide's section on adaptive equipment) offers great hope because it allows John to face forward on his board for walking in the lift line, loading the lift, and unloading.

After eight years John was at last able to load and unload the chairlift independently. In his ninth year, he was able to ride independently on all green and most blue terrain. John's newest goal is to get into race gates and decrease the amount of his outrigger use. He can currently lift his outrigger off the snow for 8 to 10 linked turns.

John's love of snowboarding has grown with his accomplishments. Tears of joy and a feeling that just cannot be expressed well up inside of his instructors every time they see John riding independently out on the hill.

In Conclusion . . .

Snowboarding is an amazing sport that, for many, speaks to a sense of freedom and personal expression. Anyone can snowboard—that is the beauty of it. Snowboarding offers exciting opportunities for many students, and the techniques and adaptive equipment described here are intended to help you get them riding safely and having fun.

Helping your students experience the joys and exhilaration of sliding on snow, of standing sideways (or forwards!), and getting their first turn in fresh snow opens the door to experiences and sensations very different from anything they'll experience the rest of their lives. Even if they are only going to experience snowboarding for a day, or an hour, make it the best day possible.