CADS SKI INSTRUCTOR MANUAL

Edited -September 2018

Table of Contents

VISION:

CADS is recognized nationally and internationally for its leadership in alpine adaptive snow sports.

MISSION:

CADS provides opportunities for people with disabilities to experience the joy of participating and competing in alpine adaptive snow sports. CADS does this by developing and promoting adaptive snow sports through partnerships, training, and instructor certification programs.

Acknowledgments

Knowing where we come from is always a good starting point, and I would like to specially thank a small group of life time believers who contributed significantly over the years: Jerry Johnston, Ted Rhodes and Bob Gilmour. The dream they had and shared, is still living today and is about to take another step.

This CADS Instructor Manual edition along with the revised CADS Certification System, are both steps in creating positive possibilities for individuals living with a disability to enjoy snow sport activities. This revised manual encompasses detailed assessment tools, teaching steps, enhanced instructor knowledge and competency standards.

In addition, I would like to recognize the multitude of extremely dedicated individuals who believed in the possibility of re-writing the previous CADS Instructor Manual starting with the CADS National Technical Committee, countless experienced CADS instructors, specialists in specific areas, and the CSIA and CADS Board Members.

And lastly, CADS would like to thank Resorts of the Canadian Rockies Inc. for their generous support towards the creation of this manual.

RCR Kimberley

RCR is proud of our long-standing support of CADS! Most importantly we are really amazed by the incredible amount of good that the organization does to support sport and making sport possible. There is so much good that comes from this! Our team is thrilled to take part in assisting CADS!.

Contribution by module:

Visual Impairment, 3 Track, 4 Track and Sitski: Jim Anderson, Kim Atkins, Nip Bradford, Tommy Chevrette, Thomas Griffith, Susan Hughes, Ian McArdle, Jamie McCulloch, Bruce Meredith, Jamie Spencer, Dick Taylor, Bob Vickers as well as many experienced CADS instructors who reviewed the Draft copy. A special thanks for Clay Dawdy, Bobby Palm and Bob Gilmour for developing the Tethering Training step exercises for Stand-up skier and Sitskier.

Autism Spectrum Disorder and Cognitive Impairment: Jim Anderson, Kim Atkins, Nip Bradford, Tommy Chevrette, Thomas Griffith, Susan Hughes, Ian McArdle, Jamie McCulloch, Bruce Meredith, Jamie Spencer, Dick Taylor as well as many experienced CADS instructors who reviewed the Draft copy.

Additional contribution is gratefully acknowledged for their valuable expertise; Kim Cosman, Stephanie Jull (Canucks Autism Network), David O'Brien, Bernard Oligny, Pat McKimmon, Brian Sarsfield, and Michelle Schaefer (Autism interventionist). Thank you to Canucks Autism Network (Vancouver, BC) for sharing their visual resources.

Thanks to each and everyone of you,

Sincerely,

Tommy Chevrette,
CADS Technical Committee Chair.
CADS Instructor Manual Coordinator.

Long Term Skier Development (LTSD)

Alpine Canada (ACA) and the Canadian Association for Disabled Skiing (CADS) joined forces in April of 2012, to host a Sport Summit sponsored by the Canadian Paralympic Committee. The collective goal was to define a clear pathway for Long Term Skier Development (LTSD) as it relates to adaptive/para-alpine skiing in Canada.

LTSD is a nine stage training, competition and physical literacy pathway guiding an individual's experience in sport and physical activity from childhood through all phases of adulthood, from simple to more complex skills. It respects and utilizes the natural stages of physical, mental and emotional growth in participants and athletes and matches skills and activities to each individual's stage of development. It ensures a participant's potential is maximized. It encourages lifelong participation.

The Para pathway is a visual chart that illustrates the stages that a participant/athlete will move through to become a para alpine athlete. Not all participants/athletes are expected to move through all stages. In fact, most will remain active for life at the Skier Essentials stage. A few will progress to the Train to Win stage. It is important that this pathway is identified in order to link grassroots programs with race development programs to assist participants in reaching their highest potential.

CADS is directly involved in the first 5 stages (Awareness, First Contact, Gliding Start, Skier Essentials and Learn to Train) and the 9th (last stage) Skiing for Life.

For more information, please refer to Appendix 1.

Safety and Risk Management

CADS is insured for liability under the insurance policy carried by the Canadian Ski Association (CSA). From an instructor's perspective, please refer to Appendix 2, which outlines basic instructor responsibilities and Duty of Care.

Alpine Responsibility Code

An instructor must teach in strict accordance with the Alpine Responsibility Code, and ensure that the students under supervision are skiing in full compliance with the code, as well as understand the reasons for doing so. Please refer to Appendix 3 to view the complete code.

Code of Ethics

When you, as a ski instructor, agree to undertake the instruction of a person, whether that persons is an adult or a child, you enter into a special relationship with that individual, out if which the court will impose upon you a duty of care and code of ethics for the safety of that student. This duty of care and code of ethics commences when you first meet your student at the start of the lesson and does not end until the lesson is completed. Please refer to Appendix 2 for the Duty of Care and to Appendix 4 for the Code of Ethics to review expectations.

Code of Conduct

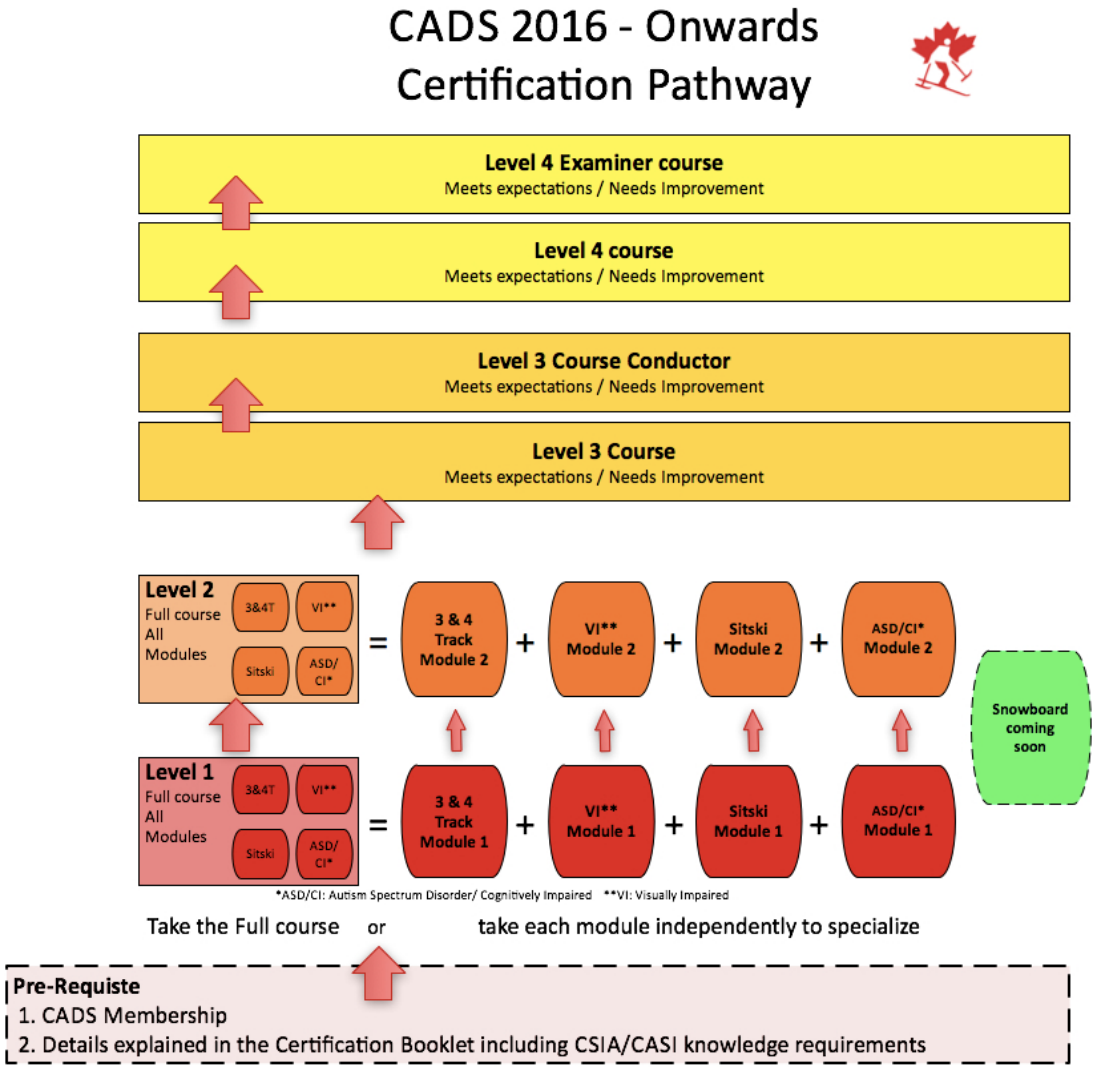
The key codes of conduct are based on Respect for Peers and Participants, Teaching Responsibility, Integrity and Honoring Sport.

Please refer to Appendix 5 for detailed Code of Conduct expectations.

3.1 - Certification System for CADS Instructors

The CADS certification standards were developed by the CADS National Technical Committee (TC) and reviewed by a group of CADS experienced instructors and key stakeholders. The finalized Certifications were then approved by the CADS National Board of Directors. The certification standards for all levels represent knowledge and competency standards for relative to the CADS Instructor Manual. The standards provides the basis for a program of training for potential and existing volunteers and instructors. The CADS certification System for the Level 1 and 2 can be offered as a full course over several days or in the form of modules that candidates may undertake on an individual basis. However, all modules must be successfully completed before full certification may be attained. Modules only exist for Levels 1 and 2.

The standards for certification are based on knowledge, teaching ability and skiing competencies, outlined in detail in the certification booklet for each level.



Safety and Risk Management

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It is very important to bear in mind that, in the eyes of the law, your role as an instructor is not simply to educate your student on the finer points of skiing, but rather act as a knowledgeable, responsible and vigilant guide to the student while on the mountain. An instructor must teach in strict accordance with the Alpine Responsibility Code, and ensure that the students under supervision are skiing in full compliance with the code, as well as understand the reasons for doing so. The instructor must exercise great judgement in selecting the terrain upon which the lesson will take place, to ensure that it is commensurate with the student's ability and minimizes the risks arising from natural hazards. The Alpine Responsibility Code is presented in Appendix 3.

Safety and liability concerns are part of every operation at a ski resort. Ski instruction carries its own set of risks and responsibilities. Recognition and avoidance of risk is the first step. Instructors should be aware of ski area layout and equipment as well as traffic patterns. Monitor and consider conditions constantly. Use your best judgement to avoid situations that could put your clients at risk. If you find yourself in situations that are inappropriate for your clients, use your knowledge to reduce the risks and guide your clients to safety.

In case of an accident, know and respect snow school and resort policies. The general guideline presented here is superseded by your resort's policy.

1. Stay with the injured person. Reassure and make them comfortable, but do not move them unless there is a high risk of further injury or death, in which case you must assure your own safety and then remove the injured person from further danger.
2. Notify ski patrol immediately by sending a blocker, volunteer/helper, or passing skiers, to the bottom of the closest lift. Be sure they know how to get to the lift and that they can describe the location and nature of the accident.
3. If with more than one skier, keep the group together. If your students are adults, you can arrange a meeting place for later. However, it is generally preferred to keep everyone together.
4. Take note of the following:
   - Note the details relevant to the accident
   - Time and location
   - Conditions and visibility
   - How the accident occurred
   - Instructors and students relative location at the time of the accident. Note measurements if appropriate. If another party is involved keep them at the scene and note their name and contact information. If there are witnesses, keep them on the scene and ask them to make a statement to ski patrol. Note any relevant information in regard to your instructions to the class and the injured party's response to your instructions.
5. Fill out required accident reports at the snow school, ski patrol and CADS insurance company. Follow up with patrol to see what the injury was and what steps were taken.
6. ***Do not make any statements or speculations on the accident. Refrain from judgments and comments.***

Words with Dignity

As recommended by the Active Living Alliance for Canadians with a Disability (www.ala.ca), the following terms are suggested to describe persons with a disability. Follow this link for a downloadable bookmark. www.ala.ca/Images/PDFs/wordswithdignity.pdf

Instead of....	Use...
Disabled, handicapped, crippled	**Person (s) with a disability**
Crippled by afflicted with, suffering from, victim of, deformed	**Person who has ... or, Person with...**
Lame	**Person who is mobility impaired**
Confined, bound restricted to or dependent on a wheelchair	**Person who uses a wheelchair**
Deaf, dumb, deaf mute, hearing impaired	**Person who is deaf, hard of hearing**
Retarded, mentally retarded	**Person with a cognitive or developmental disability**
Spastic (as a noun)	**Person with Cerebral Palsy**
Physically challenged	**Person with a physical disability**
Mental patient, mentally ill, mental, insane	**Person with a mental illness, Person who has schizophrenia, Person who has...**
Learning disabled, learning difficulty	**Person with a learning disability**
Visually impaired (as a collective noun)	**Persons who are visually impaired, blind.**

If in doubt, ask. Most people with a disability will be more than willing to help you.

Glossary of Terms

ALPINE	Of or relating to downhill skiing or a competitive downhill skiing event; specifically any type of skiing in which the primary objective is to ski downhill.
ALPINE CANADA ALPIN (ACA)	The governing body responsible for alpine ski racing in Canada www.alpinecanada.org
ALPINE RESPONSIBILITY CODE	A set of guidelines/rules that everyone is expected to adhere to in order to ensure a safe outdoor alpine experience for all.
AMPLITUDE	The range of movement. An individual with a brain injury may experience less flexibility when a movement is performed quickly.
AMPUTEE	A person who has a missing or partial limb(s). - Congenital (from birth) - Acquired (surgically removed).
AK	Amputation above the knee - includes hip disarticulation (removal of leg through the hip joint)
AOT	The assessment process used by CADS instructors: **A**sk, **O**bserve, **T**est.
APPLIED BEHAVIOURAL ANALYSIS	A teaching technique that rewards a person for making a correct choice. Incorrect choices are ignored, or not rewarded. Therefore, students learn by making simple associations between cause and effect.
ARTHROGRYPOSIS	Condition in a newborn child when joints don't move as much as normal and may even be stuck in one position. Often the muscles around these joints are thin, weak, stiff or missing.
ATLANTO- AXIAL DISLOCATION	A condition characterized by excessive movement at the junction between the atlas (C1) and axis (C2) as a result of either a bony or ligamentous abnormality.
AUTISM SPECTRUM DISORDER (ASD)	Also referred to as autism, is a neurological disorder which causes developmental disability. Autism affects the way the brain functions, resulting in difficulties with communication and social interaction, and unusual patterns of behaviour, activities and interests. **See CADS Instructor Manual ASD section for further information.*
AUTONOMIC	A division of the peripheral nervous system that influences the function of internal organs.
AUTONOMIC DYSREFLEXIA	A sudden rise in blood pressure in spinal cord injuries resulting from a noxious stimuli (i.e. distended bladder blocked catheter, urinary retention, urinary tract infection, etc.). It **CAN BE LIFE THREATENING**.

BK	Amputation that is below the knee.
BALANCE	A state of equilibrium. In the CSIA, balance is defined as the relationship between the centre of mass and the base of support.
BI-LATERAL	Means two limbs have been affected and could be on one side, an arm and a leg, both legs, or both arms.
BLIND / VISUALLY IMPAIRED	Legal blindness in Canada is defined as a range of vision from the perception of light of 10 percent or less vision. Other visual impairments include color blindness, tunnel vision, night blindness, and a lack of visual acuity. **See CADS Instructor Manual Visual Impairment section for further information.*
BLOCKER / TAILGUNNER	A volunteer who skis behind the guide and VI skier. This individual: Anticipates the turns of the VI skier, skiing across the slope in order to block up-hill traffic; Acts as the 'blocker', stopping above the situation to alert the public if the VI skier falls and/or loses a ski that requires the "lead" guide to put the ski back on; Messenger to seek assistance should the VI skier fall or otherwise require medical attention from a Ski Patrol after assistance.
BASE OF SUPPORT (BOS)	The areas of the skier (the bottoms of the skis and the poles) that are in contact with the snow surface, which support the skier's body and transmits forces from the centre of mass to the surface of the slope. A wider stance broadens the BOS and increases stability. A pole plant also momentarily increases the base of support.
CADENCE	The steady rhythm of the instructor's voice when giving directions to a student.
CADS	Canadian Association for Disabled Skiing www.disabledskiing.ca
CANSI	Canadian Association of Nordic Ski Instructors.
CANT	A beveled wedge put under the person's foot to level the ski onto the snow.
CASI	Canadian Association of Snowboard Instructors www.snowpro.com
CSA	Canadian Ski Association www.canadiansnowsports.com
CSCF	Canadian Ski Coaches Federation www.snowpro.com
CSIA	Canadian Ski Instructors Alliance www.snopro.com CADS instruction follows CSIA teaching progression and methodology where possible.
CENTRE OF MASS (COM)	A unique point in the body around which the mass is equally distributed in all directions. When skiing, the COM is constantly changing.
CEREBELLAR LESIONS	Brain lesions (lesions on the brain) are any type of abnormal tissue in or on brain tissue. Major types of brain lesions include: traumatic, infectious, malignant, benign. Symptoms: Uncoordinated muscle movement that may affect gait, over or under-reaching, focus and gaze.

CEREBRAL PALSY	Cerebral Palsy is a term used to describe a group of disorders affecting body movement and muscle co-ordination. The medical definition of cerebral palsy is a "non-progressive" but not unchanging disorder of movement and/or posture. **See CADS Instructor Manual for further information.*
CERTIFIED SKI TECHNICIAN	An individual who is trained and certified to service (or repair) skis to ensure they are in the correct condition to perform correctly on the snow.
CLOCK SYSTEM	The system of directing a skier (usually a VI skier) using the numerals of a clock. Eg. 1 o'clock ~ slight turn to the right, etc
COGNITIVE DISABILITY	A condition that results in a person having greater difficulty with one or more types of mental tasks than the average person. Clinical diagnoses of cognitive disabilities include autism, Down Syndrome, traumatic brain injury (TBI), and even dementia. Less severe cognitive conditions include attention deficit disorder (ADD), dyslexia (difficulty reading), dyscalculia (difficulty with math), and learning disabilities in general. **See CADS Instructor Manual for further information.*
CONGENITAL	Inborn, inherited. Having a particular disease or physical abnormality from birth.
CONGENITAL HIP	Dislocation of the hips at birth - usually fused, having restricted movement.
CYSTIC FIBROSIS	A hereditary disorder that causes the production of abnormally thick mucus, leading to the blockage of the pancreatic ducts, intestines, and bronchi and often resulting in respiratory infection.
DEAF / HEARING IMPAIRED	A person who cannot hear over 55 decibels in best ear.
DIABETES	Diabetes mellitus is a metabolic disorder characterized by the presence of hyperglycemia due to defective insulin secretion, defective insulin action or both. Diabetes mellitus is associated with damage, dysfunction and failure of various organs - especially the kidneys, eyes, nerves, heart and blood vessels. **See CADS Instructor Manual for further information.*
DOWN SYNDROME	A congenital disorder arising from a chromosome defect, causing intellectual impairment and physical abnormalities including short stature and a broad facial profile. **See CADS Instructor Manual for further information.*
DYSCONTROL	The inability to control behaviour.
EPILEPSY	A group of neurological diseases characterized by seizures. Epileptic seizures are episodes that can vary from brief and nearly undetectable to long periods of vigorous shaking.
FALL LINE	The path of least resistance on a ski slope. The direction a rolling ball would follow down a slope. The term "snowball line" is sometimes used with younger, beginning skiers. A slope can have several fall lines.
FAN PROGRESSION	An exercise that involves the traversing across a slope, turning uphill to a stop. **See CADS Instructor Manual for further information.*

FEEDING TUBE	A medical device used to provide nutrition to patients who cannot obtain nutrition by mouth, are unable to swallow safely, or need nutritional supplementation. The state of being fed by a feeding tube is called gavage, enteral feeding or tube feeding.
FIVE FUNDAMENTAL SKILLS OF SKIING	1. Stance and Balance (Centered mobile stance) 2. Timing and Coordination (Timing of the turn and coordination of the movements) 3. Pivoting (Steering with the lower body) 4. Edging (Balancing on the edges) 5. Pressure Control (The skier's ability to load and unload the skis by balancing against turning forces and/or using muscular efforts)
FLEXION	Bending the ankle, knee and hip joints to lower the body position and / or absorb irregularities in the snow.
FOUR (4) TRACK	A skier using 2 outriggers and 2 skis, using four points of contact with the snow.
FRAGILE X SYNDROME (FXS)	A genetic condition caused by a mutated gene located on the X chromosome resulting in intellectual disabilities, behavioral and learning challenges and various physical characteristics. Though FXS occurs in both genders, males are more frequently affected than females, and generally with greater severity. Life expectancy is not affected in people with FXS. **See CADS Instructor Manual for further information.*
FRUSTRATION TOLERANCE	The ability to tolerate some frustration when an impulse is inhibited or prevented.
GAIT	The pattern of movement of the limbs while walking or running.
GLIDING	The act of sliding on the snow.
GROSS MOTOR SKILLS	The abilities required in order to control the large muscles of the body for walking, running, sitting, **crawling** , and other activities.
GUIDE	A competent skier who can guide a visually impaired or blind person around the ski area and while skiing. May use voice guiding, visual cues, beeper, pole or headsets.
GUIDED MILEAGE	Skiing with a volunteer or instructor to practice and consolidate newly acquired skill(s).
HERRINGBONE	Means of climbing forward up a gentle slope with minimal slipping using the inside edges of the skis.
HOCKEY STOP	A sudden stop accomplished by quickly turning the skis while engaging the edges.
HYPERACTIVE	Overactive
HYPOACTIVE	Underactive
HYPERREFLEXIA	Also Hyper-reflexia **See autonomic dysreflexia.*
HYPERTONICITY	Increased tension of the muscles, resulting in muscle tone that is abnormally rigid, hampering proper movement.
HYPOTONICITY	Having deficient tone or tension (i.e. Muscle tone).

INTELLECTUAL DISABILITY	A broad term used to describe any condition that includes a lifelong impairment to a person's ability to learn or adapt to their environment. Related terms: **Cognitive Disability, Developmentally Delayed**. Includes: **Down Syndrome, Fragile X Syndrome, Autism Spectrum Disorder, Learning Disability, Brain Injury** and others.
KINESIOLOGY	A multi-disciplinary science that focuses on how the human body functions and moves.
LIFT	A mechanism for transporting skiers up a slope. Examples: surface lift, chair lift (fixed or detached), gondola.
MOGULS	Close rounded bumps usually found on Intermediate to Expert ski runs created by skiers while turning.
MULTIPLE SCLEROSIS (MS)	A condition in which the immune system attacks the protective sheath (myelin) that covers nerve fibers and causes communication problems between the brain and the rest of the body. Eventually, the disease can cause the nerves themselves to deteriorate or become permanently damaged.
MUSCULAR DISTROPHY	A group of neuromuscular disorders characterized by the progressive weakness and wasting of the voluntary muscles that control body movement.
NEUROSIS	A relatively mild mental illness that is not caused by organic disease, involving symptoms of stress (depression, anxiety, obsessive behavior, hypochondria)
OUTDOORS FOR ALL	A foundation founded in the Pacific Northwest of the United States providing adaptive and therapeutic recreation for children and adults with disabilities. www.outdoorsforall.org/about-us/who-we-are/
OUTRIGGER	An arm crutch with a ski tip attached to the lower end. Usually used in pairs. Flip-up outriggers have a hinge system to allow the ski attachment to raise vertically to be used as a normal crutch. Types: Stand-up & Sitski
PARALLEL	Position that requires the skis to remain the same distance apart from tips to tails, not necessarily together or touching.
PARAPLEGIA	Paralysis of both lower limbs due to a spinal disease or injury.
PARESIS	A condition of muscular weakness caused by nerve damage or disease; partial paralysis.
PARKINSON'S DISEASE	A progressive disease of the nervous system marked by tremor/shaking, muscular rigidity, and slow, imprecise movement, chiefly affecting middle-aged and elderly people.
PHYSIOTHERAPY	A branch of rehabilitative medicine aimed at helping patients maintain, recover or improve their physical abilities.
POLIO	A viral infection in the spinal cord effecting transmission of nerve impulses from the brain to the muscles in the limbs. Skin sensation retained. There can be no muscle built in the affected limb.
POST POLIO	Post-polio syndrome (PPS) is a condition that affects polio survivors years after recovery from an initial acute attack of the poliomyelitis (polio) virus. Post-polio syndrome is mainly characterized by new weakening in muscles that were previously affected by the polio infection as well as in muscles that seemingly were unaffected

PROGRESSION	The steps taken in the development of a skier (athlete). Progression clearly describes the prerequisite, goal and abilities for each level.
PROSTHESIS	An artificial (man-made) device that replaces a missing body part, which may be lost through trauma, disease, or congenital conditions.
PSYCHOSIS	A severe mental disorder in which thought and emotions are so impaired that contact with external reality is lost.
QUADRIPLEGIA	Paralysis of both lower limbs as well as both upper limbs due to a spinal disease or injury.
QUADSKI	A biski fitted with stabilizers ("arms" with short ski tips that attach to either side of the biski frame.
RESIDUAL LIMB	The part of the body that remains after an amputation has been performed.
SCHIZOPHRENIA	A mental disorder often characterized by abnormal social behavior and failure to recognize what is real. Common symptoms include false beliefs, unclear or confused thinking, auditory hallucinations, reduced social engagement and emotional expression, and lack of motivation.
SCOLIOSIS	A curvature of the spine.
SECONDARY DISABILITY	One that is not identified, obvious, or most visible, but must be determined and considered if present.
SEIZURE DISORDER	A condition is termed "seizure disorder" once two or more seizures have been recorded.
SELF ESTEEM	Confidence in one's own worth or abilities; self-respect.
SENSORY MOTOR INTEGRATION	Sensory motor integration is the relationship between the sensory system and the motor system. Since the two communicate and coordinate with each other, if one is problematic, the other can suffer as a result including, but not limited to: • Difficulty with hand-eye coordination activities. Perceived motor difficulty. • Motor planning delay. Delayed visual processing. • Directional awareness difficulty.
SHUNT	A hole or a small passage which moves or allows movement of fluid from one part of the body to another. The term may describe either congenital or acquired (medically implanted) shunts. Acquired shunts (sometimes referred to as iatrogenic shunts) may be either biological or mechanical.
SIDESTEP	A means of climbing sideways up a gentle slope with minimal slipping using the edges of the skis.
SIDESLIP	Sliding down the Fall line of the slope without engaging the edges of the skis.
SITSKI / SITSKIING	Method used for skiing where skier sits in a molded seat over two skis (biski) or single ski (monoski) using two outriggers or two skis (biski) using fixed outriggers.
SNOWPLOW (See WEDGE)	A technique taught to beginning skiers to stop and/or slow down by placing the skis in a "V" position with tips together and tails (heels) apart.

SNOW WING	Adaptive equipment designed to help stabilize the student's upper body. Also provides a means to assist the student as needed for turns and speed control.
SOCIAL SKILLS	The ability to interact and communicate with others. Social rules and relations are created, communicated, and changed in verbal and nonverbal ways. The process of learning these skills is called socialization.
SPINA BIFIDA	Abnormality at birth in bony vertebrae about the spinal cord. Can range from mild muscle weakness to total paralysis in limbs.
SPINAL CORD INJURY (SCI)	Damage to any part of the spinal cord or nerves at the end of the spinal canal - often causes permanent changes in strength, sensation and other body functions below the site of the injury. **See CADS Instructor Manual for detailed information.*
STROKE	A stroke is a sudden loss of brain function caused by the interruption of flow of blood to the brain (ischemic stroke) or the rupture of blood vessels in the brain (hemorrhagic stroke). The interruption of blood flow or the rupture of blood vessels causes brain cells (neurons) in the affected area to die.
SURFACE LIFT	Any one of several mechanized system for pulling or carrying skiers and snowboarders uphill, along the surface of the snow. Examples: Rope Tow, Handle Tow, Magic Carpet, T Bar, J Bar, Platter (Button, Poma).
SYMPATHETIC NERVOUS SYSTEM	Stimulates the body's fight-or-flight response. It is also constantly active at a basic level to maintain homeostasis, that is, to maintain balance amongst the systems of the body or return systems to functioning within a normal range
TERRAIN	A general term in physical geography referring to the lay of the land.
TETHER	A length of nylon webbing (~2.5 cm.X~4 m.) used by the instructor to control the speed and direction of a stand-up skier or sitski skier.
TETRAPLEGIA	See quadriplegia.
THREE (3) TRACK	Skiing with 2 outriggers and 1 ski, using 3 points of contact with the snow.
TRAVERSE	To ski across the "fall line".
WEDGE (Stem)	Position of the skis where the 'tails' of the skis are farther apart than the 'tips'. Used to introduce beginning skiers to slowing and stopping. Also: 'gliding wedge', 'snowplow', 'pizza'.
WEDGE CHRISTIE	Wedge Christie (Stem Christie): A ski turn begun by stemming a ski (pushing the tail outward) and completed by bringing the skis parallel into a christie (a braking turn in which the ski tails are allowed to skid).
WEDGE TURN (Stem Turn)	The most basic form of stemming. A turning technique taught to beginning skiers where the entire turn is completed in the 'wedge' position. Also known as a snowplow turn.

Equipment and Modifications

This information is to assist the instructors and coordinators of programs to understand the equipment choices for students to adapt if necessary to improve the snowsport experience for the skier with a disability. It is essential that the skier is equipped with safe and appropriate equipment for their level.

The object of modifying equipment is to keep the skier with a disability in a normal balanced stance.

This information is intended to be a guide only as each student will have their own specific needs that pertain to their ability and required adaptations.

Ski Boots

Ski boots sold in Canada through ski stores will conform to national safety standards. It is advisable to students when purchasing boots that they go to a ski store that has a certified boot fitter and the result is usually a better experience for the skier. The boot fitter can advise on the right kind of boot for the ability and range of the skier. If modifications are necessary, the boot fitter will work with the client/student to ensure a proper fit.

Adaptations

For the skier with a disability, boot modifications may be required. The object of modifying the equipment is to keep the skier with a disability in a normal balanced stance. i.e. if the foot is ***splayed*** out - then a device is made to keep the foot in its natural position and **NOT** the position that would be assumed by an able-bodied skier.

1. Braces:
Two methods may be used. The liner may be taken out of the boot and the shoe and the brace placed inside the shell. In the second method the brace is fitted with a cup fixture and the foot and brace can then be fitted in the boot without the shoe. This method is much warmer than the first.

2. Canting:
Some boots have a built in mechanism, which allow the boot to be tilted or slanted to fit the angle of the foot. There may be a limit to the degree of canting (5 to 10 degrees). If necessary a block may be placed between the binding and the ski for additional canting. Be aware that the ski brake may not function properly and therefore the block should be placed in the binding and fixed under the ski boots.

3. Heel lifts, arch supports, orthesis (orthotics) can usually fit inside the boot(s).
4. Different boots: some skiers may require different size and type of boot for each foot.
5. Boot punch: if pressure points develop, boots may be punched out to provide more room to the pressure site. This should be done by a boot fitter at a ski shop. There is a limit to the amount of adjustment that can be made.

Bindings

Bindings are used to attach the boot to the ski while still allowing the ski to release during a fall. There are many different types of bindings available on the market. Bindings are most often sold as part of the ski package (skis and bindings) at the entry level to advanced level of skier.

Note:
1. Binding adjustments should only be done by a qualified ski technician. Bindings should be checked on a regular basis and should be re-adjusted as the skier progresses in ability or increases in weight.
2. Ensure the skier can operate the binding, or that every assistant with the skier can.
3. Every binding **MUST** be equipped with a retention device or ski brake.

Adaptations

The object of modifying bindings is to keep the skier with a disability in a normal balanced stance. If the foot is splayed out, then a device is made to keep the foot in its natural position and secure the ski to the boot to retain his/her position.

1. Canting: when a block is used to provide tilt or angle to accommodate the angle of the skier's foot, the cant could be placed under the binding only if the ski brake is not altered. If the ski brake does not operate properly the cant is placed in the binding and fixed under the ski boot.
2. Positions: bindings may be mounted in a forward or offset position.
3. Adjustments: skiers with different disabilities may require different adjustments of tension on their bindings. Evaluate their weight and ability and have any adjustment done by a professional ski technician.

Skis

There are many variables when considering skis such as skiing ability, skier weight, skier aspirations, budget etc…with options such as all-mountain, rocker, traditional camber, each with recreational – advanced options. The short ski will enable a beginner skier to initiate turns easier and therefore progress much more rapidly.

How to Choose a Ski

1. Work with a ski technician at a ski store who can help select the appropriate ski for an individual to match their ability and type of skiing.
2. Length - depends on competence of skier, weight and what you want the ski to do.
3. Many rental shops have a variety of skis - try several brands before choosing and discuss performance of the ski with the shop professional.

Outriggers

Outriggers are used primarily for balance. The outrigger is a forearm crutch with a short ski attached to the bottom of the crutch and takes the place of ski poles. Outriggers may be used in "ski position" for skiing or in "crutch position" to aid in walking.

Adjustments are detailed in the 3 track and 4 track sections in this manual.

It is important that we adjust the outriggers so that we create an environment that sets our skiers up for success.

7.1 - Outriggers

It is important that outriggers be set up adequately in order to promote correct positioning and create an environment setting skiers up for success.

Outrigger Set Up:

Introduce Outriggers:

Most outriggers manufacturers provide full instructions on how to assemble their outriggers kit properly. However, three main adjustments remain essential:

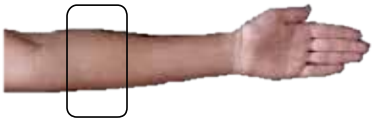
A - Distance from handle to cuff;

B - Distance from handle to the ski;

C - Heel screw adjustment;

A - Distance from handle to cuff:

The cuff sits with the open part on the outside of the arm, with the inner part resting on the fleshy part of the forearm. You may have to shorten or lengthen the adjustable part between handle and cuff to achieve the proper positioning.



The rectangle shows the suggested place where the outriggers cuff should rest. Make sure that the elbow has no restricted movement, which could increase the chance of injury. This could happen if the cuff is placed too close to the elbow. If a cuff strap is provided, it should be done up tightly for stability but not too tight that it causes too much pressure on the forearm and restricts circulation. The cuff strap is to be pulled towards the body.

B - Distance from the handle to the ski:

This adjustment is explained in each equipment section where the use of outriggers is needed or required.

C - Ski Heel screw adjustment:

The adjustment can be done by making the screw longer (more friction) or shorter (less friction). This will affect the angle of the outrigger's ski on the snow.

A screw set longer (outside the ski base) will decrease the angle of the outrigger's ski from the shaft and therefore, increase the amount of resistance of the heel on the snow while sliding.

Here the point to remember is more friction.

A screw set shorter (bolt is screwed into the ski base) will increase the angle between the outrigger's ski from the shaft and therefore, decrease the amount of resistance of the heel on the snow while sliding.

Here the point to remember is less friction.

The adjustment of the screw of the outrigger will change as the skier develops / progresses. Thus, it is advised that the outriggers be set with more friction for a beginner to provide more control over speed as to assist with balance and stability.

Be aware of the screw being too long as it provides too much resistance and forces the skier's arms and shoulders back. You will often see a skier trying to compensate for the friction caused by the heel by leaning the upper body forward. This causes an unbalanced position.

As the skier improves, shorten the screw in order to allow the outrigger's ski to travel smoothly on the snow. At this level of skiing, the skier should be able to balance and have adequate steering skills so that he can control his speed without having to rely on the heels of the outriggers.

Remember, that if outriggers are required and the adjustment is not adequate for the skier's needs, then do not proceed as you are responsible for the skier's security and accountable for ensuring proper risk management assessment.

Teaching Aids

Teaching aids presented in this section are likely to apply for most students. We cannot possibly describe all existing teaching aids as the limits is mainly your creativity, along with ongoing assessment that will, add to, remove or adjust the student's equipment, and alter your teaching.

To adapt your teaching you will require the learning style of your student. A learning style is the way a person's sensory, perceptual, memorial, decision-making, and feedback mechanisms operate. In other words are they Feelers, Doers, Observers or Thinkers.

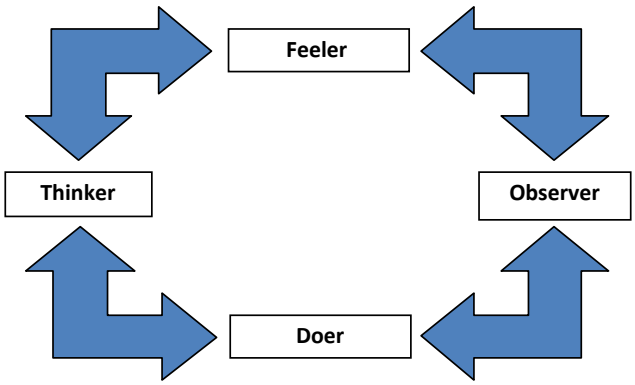
You may also use the hands on guiding – teaching technique after the student has given you the affirmative to do so. This technique is successful with those who learn by Doing, Feeling and Observing. Moreover, by explaining to your student what to do using the hands on technique, it also connects with Thinkers who learn best when their auditory system is stimulated with clear and concise descriptions. They typically prefer to know the "why" of the new information or task presented.

In addition to the above, a complete assessment of the student's abilities will lead to positive development.

Learning Styles

A learning style is the way a person's sensory, perceptual, memorial, decision-making, and feedback mechanisms operate.

Each individual is unique with their ability, knowledge, attitude, past experience, personality, etc. The same applies to the dominant and non-dominant learning style. Some individuals have a dominant style; others are comfortable with more than one style. There are four main types of learning styles: Doers, Watchers, Thinkers and Feelers. Most people learn best through a combination of the four types of learning styles.



Doers:

- ✔ The individual is practical and wants to experience a new task on the spot rather than hear about it.
- ✔ Action oriented, individual prefers to do rather than think and would also prefer risky activity rather than routine activity.
- ✔ This individual learns by trial and error… regardless of what the instructor may say. This type of individual will not respond very well to a teaching method using elaborate and wordy descriptions.
- ✔ Use pictures and action words or use another person to demo… while the student observes; focus on the main objectives keeping verbal commands minimal and simple.
- ✔ At the end of the exercise, refer back to the objective even if the task was not met. Many of these individuals may lose their concentration if there are too many details.
- ✔ Experiential learning is an efficient method for the Doer. To be efficient, this method should include the following components:
  - active involvement in the experience;
  - reflection of the experience;
  - analyse the experience
  - Use of decision-making and problem solving skills in the experience
  - Safe environment to practice skills learned from experience

Observer:

- ✔ This type refers to "visual learners".
- ✔ The individual learns best from visual demonstrations.
- ✔ He will watch and then try to imitate your actions, but likely will let others of the group go first so as to observe more.
- ✔ If there is a need to explain without demonstration, use verbal images or video demonstration.
- ✔ Videotaping the skier's effort on the slope can make him aware of what he is doing. If using video, make sure to have a good demonstration to refer to. Be positive – point out good results and introduce changes by suggesting he tries something different.
- ✔ This individual will definitely benefit from taking action immediately after a demo from the ski instructor….

Thinkers:

- ✔ This type refers to "auditory learners".
- ✔ The individual learns by auditory instruction and thrives on clear and concise descriptions. He typically likes to know the "why" of the new information or task he is given.
- ✔ Use a specific body segment to explain what the skier is to achieve. Focus on specific muscles (contraction / relaxation) or joints (pressure).
- ✔ Thinkers need to analyze the situation before trying it. Ask questions to help the thinker further process and verbalize his understanding.
- ✔ Individuals in this category like to be involved in problem solving process, using their cognitive abilities.
- ✔ Individuals in this category may display anxiety; by better understanding what they have to do, it decreases their stress and helps them succeed.
- ✔ Have the skier prepare as the racers do before a race: concentrate on the drill he is about to perform by visualizing what his body is about to do.

Feelers:

- ✔ This type refers to "kinesthetic learners".
- ✔ The individual learns intuitive concrete experiences and processes information by how they physically feel.
- ✔ He learns best by active learning sensations combined with a good description and a demo.
- ✔ The instructor should work with the student's feeling as he performs the instructed task.
- ✔ The instructor will lose the individual's interest if instructions become too analytical.
- ✔ The instructor needs to plan concrete drill exercises to develop specific abilities / movement patterns.
- ✔ This type of learner can easily transfer earlier acquired skills into skiing.

Hands to Technique

Hands on Simulation Technique

This technique is used to communicate the desired foot position and movements by having the student imagine their hands are their feet. Although intended and very effective for the blind or visually impaired, it may prove effective with students with other disabilities as well. A more detailed instructions are presented in the VI section of the CADS Instructor Manual.

With the instructor facing the skier and holding the skier's hands, the ski instructor communicates the desired foot position by manipulating the student's hands to the desired foot position and by explaining that the foot position is achieved by turning the full leg in the hip socket. Because the ski instructor is in close contact with the skier, a secure listening and learning environment is created. A "light" tactile touch is recommended as this better reflects how we ski as opposed to an overly firm touch.

It provides a high degree of confidence for the beginner and may be repeated through progression steps to assist the student in better visualising the desired outcome. Initial progression from straight running through a small wedge, can be accomplished by the instructor skiing backwards, holding the student's hands, and applying the appropriate pressure; movement can convey the proper foot pressure and leg movement. The feet and legs are pivoted or edged depending on the hand position as controlled by the instructor.

Flexion is introduced by moving the whole hand up and down, and the skier is encouraged to move constantly and remain relaxed. Explain that this is the movement to be experienced by the lower body (legs) and not the upper body.

As confidence builds up and the turns become more refined, the skier can hold out their hands as if they were the skis and the instructor can communicate pivoting, edging and weight transfer to simulate a complete parallel turn by pressuring the skier's hands appropriately.

The next step is for the instructor to progressively let go of the skier's hands and continue to ski backwards in front of the student. With the blind or visually impaired, the next step would be to ski behind the skier and use only voice communication.

Assessment of Abilities

It is strongly suggested to follow the **Ask, Observe and Test (AOT)** guidelines closely. The objective of the AOT process is to fully understand the individual's background (attitude, confidence, past experience, mobility, strength levels, balance, and athleticism).

As this manual is geared towards teaching at the beginner and intermediate levels, the proposed ability assessments will reflect questions, observations and tests that are require for these levels of skiing.

From this information and from his own knowledge of skiing and snowboarding, the instructor can then adapt and plan his teaching to ensure development of the skier to the best of his student's abilities.

This assessment process should be done on every outing, whether the student has skied before or not. As adaptive ski instructor, understanding the individual's mobility and strength levels relative to this individual's disability and ability to ski is crucial. '**Ability within disability**' should be the instructor's main concern.

Every skier is a unique individual since the effects of an injury or disability will vary from one individual to another. The completion of the detailed student analysis is required to determine which piece of equipment and which ski technique is best suited for the individual.

It is recommended to do an **AOT** test at the beginning of every season and occasionally during that season with first-time as with experienced skiers since an individual's strength and mobility may increase or decrease according to each individual's disability and environment and therefore, influence his ability to perform.

The determining factors of the abilities are:

1) Level of Injury if spinal cord injury (SCI) or nature of the disability, cognitive impairment and/or communication skills.
2) Balance,
3) Mobility and
4) Physical Strength.

While testing the ability, the focus is being on:

1- Balance: how the skier can best maintain a centered mobile stance,

2- Pivoting, how the skier can get his skis - feet - lower body to change direction, and

3- Edging, how the skier can best move laterally while staying balanced to enable the ski to edge on the snow.

In essence it comes back to the CSIA's basic skier competencies: centered mobile stance, steering with the lower body (if possible) and balancing on edges.

Before doing any AOT exercise with a skier, whether the individual is a beginner or more advanced, the instructor MUST ask the skier for permission before assisting or touching. This also applies during the delivery of any lesson after the AOT is performed.

ASK – While being aware of an individual's specific disability; it is recommended to ask questions relating to his abilities. As an adaptive ski instructor, the focus should be on the "WHAT CAN BE DONE" while at the same time, recognizing the challenges involved. This approach will help the individual to focus on the positive and not on his limitations. This will increase confidence and awareness in his own abilities and leading to success on the ski slopes.

In this section, the ski instructor will be guided to ASK questions that assess, for example,

1- Level of injury or cause of disability (What part of the body that is not affected by the injury?), cognitive impairment and/or communication skills.

2- Level of activities (what other sports does the individual participate in?)

3- Personality and attitude (where does the skier think his strengths are?)

OBSERVE - Watch the individual as he walks, moves, or shifts around. In the process, relate the ease of his movements to issues related to skiing.

In this section and as the individual moves around, the instructor should **OBSERVE** and assess the following:

1- Balance (Is the student well balanced while moving around? Is one side of the body stronger and / or moves easier than the other? Is the student looking for additional support to assist movements?)

2- Pivoting (While moving around, does the person display an ability to separate movements between his upper and lower body and where this movement comes from? How does he turn when going to and coming back?)

3- Edging (How much range of movement does the individual have from side to side?)

TEST – Remember that during the upcoming tests, some exercises will be easy to perform for the individual as others will be impossible to achieve. The results of these tests will help the ski instructor to better understand how to adapt the teaching and the equipment.

This section contains several simple balance, mobility and strength tests that can be performed, wherever possible, with relevance to movements and levels of strength that will be required for skiing.

The instructor should **TEST** the individual for:

1- Balance (How can the skier best maintain a centered mobile stance?);

2- Pivoting (How can the skier get his skis - feet - lower body to change direction?);

3- Edging (How can the skier best move laterally while staying balanced to enable the skis to edge on the snow?)

The instructor must encourage and support the individual during the evaluations according to his range of movement. For example, if an individual is asked to show how much he can turn his foot from one side to the other and he can only move it slightly in one direction, then he should be asked to point his hip in the same direction as well. This may result in an increase in the ability to have the foot change direction. At that point, positive verbal encouragement along with explanations should be provided.

Finally, frequent mobility checks must be done even with skiers with whom the instructor has skied before. The instructor may find that, because of a variety of factors, their mobility levels may differ from the last time they skied together. Understanding the skiers' mobility and strength levels is essential to be able to work and adapt to their strengths and experience the greatest success on snow.

9 - Teaching Techniques

9.1 - Visual Impairment (VI)

Overview

An individual with a visual impairment (VI) has a loss of sight that may be partial or total, and in some conditions, vision may be progressively lost. Vision impairment may be congenital (i.e. present at birth) or acquired (not present at birth, but acquired through a traumatic injury or illness). Individuals born blind (total vision loss), or those who lose their vision before general motor skills have been learned, need to learn differently (and take longer to learn motor skills) than people who learned the fundamental running, jumping, catching, and kicking skills before losing their sight. In the day-to-day environment, a person with a visual impairment will require aids or a guide to move around, and alpine skiing environment is no different. Thus, skiers with vision impairment require a guide or guides to help / assist guide the skier in an alpine environment.

As a guide, it is always important to keep in mind the following advice: "Don't assume, remember, you are the VI skier's eyes, and you have the ability to directly influence what this skier with a visual impairment can accomplish".

In Canada, the general rule of thumb to determine whether an individual is visually impaired is to enquire if they have a Canadian Institute for the Blind card, which generally means that they either have varying degrees of low vision (10% or less) or total vision loss (blind).

There are many causes for blindness or visual impairment. Common examples include cataracts, diabetes, retinopathy, glaucoma, and macular degeneration.

Assessment of Abilities

Many CADS programs utilize the International Paralympic Committee classification standards for their visually impaired skiers in order to classify the degree of visual impairment. There are three "B" classes:

B1 Class:

- VI skiers in this class profile are either blind or have very low visual acuity.
- Their level of visual acuity is such that the skier cannot recognize the letter "E" (15x15cm in size) from a distance of 25cm.
- For recreational skiing, a general rule of thumb is 0% vision (blind) or virtually no usable vision.
- Secondary hearing impairment is also more common in B1s.

B2 Class:

- Skiers with a higher visual acuity than skiers with a B1 classification, but they are unable to recognize the letter "E" from a distance of 4m.
- Skiers with a visual field of less than 10 degrees diameter are also eligible for this B2 classification.
- For recreational skiing, the general rule is 1-5% vision (very low vision).

B3 Class:

- Skier having the least severe visual impairment. These skiers either have a restricted visual field of less than 40 degrees diameter or low-visual acuity.
- For recreational skiing, a general rule of thumb is 6-10% vision (low vision).

When speaking to a B1 and some B2 students, always say who is speaking and to whom the message is directed so that the student knows that you are speaking to them. Before taking the VI skier out onto the snow, it is important to have a conversation with the skier and/or their parents (if the VI skier is a minor) in order to get a more comprehensive understanding of the visual impairment. Communication is a key component; parents and VI skiers are generally open-minded about discussing their visual impairment, their abilities and motivations.

It is worth mentioning that VI skiers will always try and "see" the guide's image in the spot of usable vision. Adjustments to guide and VI skier positioning can be made with this information.

Each instructor must have gone through the Student Medical Sheet (Appendix 6) prior beginning the AOT process.

Student Assessment: Ask, Observe, Test.

ASK

While aware of an individual's specific disability, ask questions relating to abilities.

Ask	Look for
Identify the cause of the vision impairment. Is it congenital or acquired?	Degree of visual impairment (look for the class identification: B1, B2, or B3).
How long have they had the visual impairment?	Confidence and ability to move around.
Are there any secondary disabilities that may impact the individual's skiing? (visible or not)	If so, consider need to use adaptive equipment (e.g. radios, body harness with tethers) to control speed and turn shape.
What other sports does the individual participate in?	Sports that require balance, strength and mobility as these experiences can be used to transfer some motor skills ability into skiing.
Does the individual think of themselves as fit and active? If so, why?	The ability to correctly self evaluate.
Have they used any other specialized adaptive sports equipment?	Sports that could be related to skiing as well as adaptive equipment.
Has the individual skied before?	Nature of skiing experience (positives and negatives).
Where do they think their strengths are?	Perseverance, participation in other sports, positive attitudes, determination, etc.

OBSERVE

Watch the individuals as they walk and move around. As you do this, relate the ease of their movements to mobility requirements related to skiing.

Observe	Look for	Relate to skiing
Are they well-balanced while moving around?	Unsteadiness, lack of balance and lack of confidence	The more at ease the person has with movements, the better the ability to balance we can expect through their ski progression.
		The more unsteady, the more time will be required to progress from a wedge to parallel.
Are they using additional support to assist movements?	Guide dog, use of a white cane or a person	As above
Are movement patterns quick or slow?	Quick movement patterns Slow movement patterns	The quicker the movements, the greater the confidence. This can have an effect on lesson pacing as someone that is more steady and mobile will find balancing on a ski easier and therefore, would learn more quickly.
While moving around, does the individual display an ability to separate movements between their upper and lower body?	Uses the upper body to assist the movement of the lower body. Ability to separate movement of upper and lower body.	The ability to show separation between upper and lower body movements indicates greater mobility and the ability to steer with the lower body while skiing.

TEST

Do some simple mobility and strength tests that are related to the movements and levels of strength that will be required for skiing.

Test	Look for	Relate to skiing
Identify the degree of visual impairment (inside and outside).	**Inside:** Review observations "Look for" above. **Outside:** Determine the level of usable vision by checking forward/lateral vision: • When assessing vision on snow, it is best to have the VI skier standing in an open flat area with him concentrating on looking straight ahead while you are facing him. • Move directly backwards, using verbal commands to determine distance vision. • Once direct distance sight has been determined, you should then assess lateral vision distance by moving sideways and adjusting by stepping towards the VI skier where blind spots are determined in a fan-type progression at varying heights (standing, semi-squatting or laying flat on the snow).	**Inside:** Review observations "Relate to skiing" above. **Outside:** The degree of vision impairment will determine impact on guiding which potentially, will have a direct impact on ski progression.

Test	Look for	Relate to skiing
Is vision better during the day in the sun? In the shade? At night?	Assess impact for: Fine focus vs shadows, Darkness vs light, Sensitivity to light can be painful	Depending on results, verify and adjust distance from VI skier and/or elevation of verbal commands to VI skier. Dark/Light and Light/Dark transition adaptation may be restricted and delayed in most eye conditions Color of goggle lens can really settle this down
Determine the level of usable vision using colors	Ability to identify colors within varying environmental condition.	Specific color: green, yellow, and red Below, you have an example of one of the pictures found in Appendix 2. First select the picture that represents your skiing environment. Then, ask your skier to identify the color they see the best. The guide or ski instructor should use clothing or bib colors accordingly.
Assess the VI skier's walking	Refer to "Observations" above This will determine whether the VI skier walks self-guided with a cane or with the assistance of a guide dog, or is mobile independently of these aids. This also assesses whether the VI skier uses their feet as "feelers", which can affect stance.	Refer to "Observations – Relate to skiing" above If balance is still a problem, the instructor should try different drills that improve balance, namely static and dynamic balance. Starting on a flat terrain and then on a beginner hill before using any harness. If the VI skier still has poor balance, you may consider the use of other strategies as a body harness or any equipment that may be more suitable to that individual and their abilities.
Impact of "noise"	If all your tests are done in a low noise environment, you might get good results, but if your ski environment is noisier, the VI skier response will not be as accurate, or as quick as it may be delayed, as you are use to.	If this occurs, verify and adjust distance from VI skier and/or elevation of verbal commands to VI skier.
Hearing impairment (left / right)?	If that is the case, check how the skier adapts their upper body while you move around within the determined vision parameter. On many occasions, you will observe that the skier turns their head to bring the best hearing side forward… creating an upper body rotation and therefore, a possible turn restriction.	A solution or adaptation to this possibility might be that you decrease the distance between you and the skier, speak louder, or use a two-way radio head system.

Determination of the level of usable vision using colors. Ability to identify different colors in different varying conditions. For a more elaborate interpretation, please refer to Appendix 7 at the end of the manual.

Equipment

VI skiers may own their own ski equipment or, in many cases, equipment is supplied through the CADS Para Snow Sport program. If CADS Para Snow Sport programs loan or make rental ski equipment arrangements, it is highly recommended that there is a VI skier specific form that identifies the VI skier's ability, weight and height, ski length, boot size, binding DIN settings, pole size, and size of helmet.

Skis, boots, bindings and poles:

- Same principles apply when a VI skier chooses their skis as any sighted skier.
- Use ski shop recommendations for able-bodied skiers as a guide.

Safety Recommendations:

- It is strongly recommended that all VI skiers wear a helmet to promote safety in the event of a fall or striking or being struck by the skiing public.
- It is strongly recommended that VI skiers should also wear goggles or sunglasses in order to take special precaution so that their eyes are protected from the wind, the sun, or being struck by another object.
- **A SAFETY & AWARENESS QUESTIONNAIRE FOR INSTRUCTOR / GUIDES is proposed in the Appendix 8.**

"Blind" or "Visually Impaired" and "Guide" reflective bibs should be worn to alert the skiing public outside, on the hill, and in the lift lines. It is recommended that these bibs also have reflective tape in order to enhance visibility at night or in low-light conditions.

Use of flashing "red" bicycle lights is suggested on the back of the VI Skier and Guides helmets at night or in low-light conditions to promote awareness.

Use of signage at the bottom of each ski lift line denoting VI skiers or other disabled skiers on the hill is also strongly suggested.

Teaching Aids

A variety of equipment and/or aids are available to help you teach VI skiers. These include:

Use of Directional Verbal Commands by the (Lead) Guide.

- Voice inflection is important.
- Use a firm, confident voice and tone to establish a trusting bond with the VI skier. These cues enable the VI skier to develop confidence by focusing on movement.

Key Verbal Commands

Aim	Command
Emergency stop	STOP (loud and clear)
Full stop	STOP
Speed control	SLOW DOWN
Speed control until a full stop	SNOWPLOW STOP
Straight running	CONTINUE/ KEEP GOING
Turn direction	LEFT / RIGHT
Turn using snowplow technique	WEDGE TURN
Turn using advance technique	PARALLEL TURN
Upcoming changes in terrain, chair loading/ unloading, etc.	3, 2, 1 method

- When establishing voice communication with a VI student skier
  - Try to avoid the use of similar sounding verbs such as "slow with go"
  - As a safety measure, the student should be trained that if there is a longer than normal break or gap in communication to immediately "STOP".
  - When an emergency situation arises, yell "STOP" and the VI skier should immediately stop. You may want to practice this in a safe area.
- Keep voice commands simple (e.g. "left", "right", "slow down", "stop", etc.).
- The cadence and tone of the commands is very important - at the correct speed and with predictable spacing to allow rhythm and flow. Should you feel the need to explain the hill environment, please do so in a safe place on the side of the hill.
- Avoid a constant stream of nonessential chatter, which can tire out the (lead) guide and cognitively overload the VI skier.
- In addition to the basic verbal commands, consider using another verbal technique such as the "clock system" when maneuvering through the lift line.
  - "Clock system":
    - Numbers on a clock face where 12 o'clock is straight ahead and 3 o'clock and 9 o'clock being 90 degree angles on each side.

On Snow Teaching Aids, Problem Solving, Assessment and Development Examples

Remember to put yourself as if you were in the VI skier's ski boots to determine probable causes and corrective measures.

Assessment / Observation	Possible Origin / Reason	Development / Solutions
VI skier slows down to react to "turn initiation" commands.	Fatigue setting in. Fear factor. Cannot hear the commands due to other noises or voice too low.	Stop and assess; then proceed to lodge to rest. (Fatigue chart Appendix 10) Stop and discuss with VI skier. Determine if conditions of hill, skier traffic or internal fear are probable causes. Possible solutions may be to change terrain, use of reassuring voice guiding commands to initiate and complete turns, to use of hands-on simulation technique for proper body position. Refer to next Assessment / Observation.
VI skier is not responding to your voice commands.	Too much distance between the (lead) guide and the VI skier. Too much noise on the hill or too much wind or a combination of both. Radio headset (if being used) not functioning.	Slow the VI skier down or close the gap between the VI skier and the (lead) guide. (Lead) guide elevates voice to be heard and check gap distance with VI skier or train VI skier to slow down or stop when this occurs. Check radio headsets of VI skier and (lead) guide to determine cause.
VI skier initiates and completes turns perfectly on one side but opposite side turns indicate lack of commitment to outside ski.	VI skier may have only one good eye that has limited sight while the other eye has no vision. On turn with good eye on outside ski side turns initiated and completed perfectly but when good eye is on inside ski, weight transfer tends to be more on inside ski as VI skier is following line of sight.	On turns where good eye is on inside ski, at turn initiation, have VI skier slightly turn head forward and sideways to where the skier wants to go. Doing this initiates weight transfer to the inside ski as it moves into the fall line, as it then becomes the balancing on the outside ski.

Use of Hands to Promote Correct Body Position and Teach Ski Technique

- During a ski lesson or a ski outing with a VI skier, if the VI skier is receptive, ask permission to use their hands to demonstrate basic skills such as:
  - Proper stance (narrow versus wide).
  - The most efficient way to place the skis across the direction of travel (snowplow stop, wedge turns, parallel turns) is to make the lower body lead the turning effort with the turning of the legs in the hip socket.
  - Edging (use of the ski-side cut).
  - Balance on the outside ski for grip against the snow and for direction change
- As the VI skier progresses to a more advanced level of parallel skiing, the (lead) guide may also use their hands to demonstrate:
  - Lateral balance using angulation (moving the hip inside demonstrated by the guide pushing the VI skier's hip).
  - Strong commitment to the outside ski and to promote lateral balance using angulation (the guide using the VI skier's poles with VI skier resisting the side pulling motion of the poles by stacking and moving the hip inside and up the hill).

Use of Hands to Guide

Hands on Simulation Technique

This technique is used to communicate the desired foot position and movements by having the student imagine their hands are their feet. Although intended and very effective for the blind or visually impaired, it may prove effective with students with other disabilities as well.

With the instructor facing the VI skier and holding the VI skier's hands, the ski instructor communicates the desired foot position by manipulating the student's hands to the desired foot position and by explaining that the foot position is achieved by turning the full leg in the hip socket. Because the ski instructor is in close contact with the VI skier, a secure listening and learning environment is created. A "light" tactile touch is recommended as this better reflects how we ski as opposed to an overly firm touch.

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Flexion is introduced by moving the whole hand up and down, and the VI skier is encouraged to move constantly and remain relaxed. Explain that this is the movement to be experienced by the lower body (legs) and not the upper body.

As confidence builds up and the turns become more refined, the VI skier can hold out their hands as if they were the skis and the instructor can communicate pivoting, edging and weight transfer to simulate a complete parallel turn by pressuring the VI skier's hands appropriately.

The next step is for the instructor to progressively let go of the VI skier's hands and continue to ski backwards in front of the student. With the blind or visually impaired, the next step would be to ski behind the VI skier and use only voice communication.

Use of Directional Hand Signals

- This is acceptable where the VI skier has useable sight (i.e. B3), or as an alternative if the radios fail to function and the (lead) guide is guiding from the front.
- This method can be used where the ski hill is well-groomed and has limited skier traffic in order to promote a safe skiing environment.

- Caution should be used by the (lead) guide to ensure proper distance is kept to allow the VI skier to ski within their visual field; constant over-the shoulder-checks by the (lead) guide are recommended after each turn initiation for safety purposes.
- Examples of hand signals are: Left arm extended to denote start of left turns, right arm extended to denote start of right turns; waving of both extended arms to slow down; extended both arms above the head with a pole cross to stop; a forward extension of either right or left arm (use of left or right dependent on best use of VI skier's visual field) with a rolling type motion to denote an oncoming bump or a drop in terrain.
- It is recommended that the use of these hand signals be discussed with the VI skier prior to their use and when initiated; use a slower speed to ensure comfort with the use of these signals.

Personal Two-Way Radios

- Should provide voice activation and hands-off microphones for the guide to communicate with the VI skier.
- Some motorcycle radio headsets that affix to the helmet work best.
- Recommended for low-vision B2 and B3 VI skiers and can be used with B1 skiers as well.
- The radio batteries (lithium preferred choice) should be checked regularly and an alternate signaling system should be established in case of failure.
- For B1 VI skiers, another option is a radio with a voice activated microphone that transmits the guide's voice to a speaker which is strapped onto the lower back or outside a backpack, allowing the B1 VI skier to follow the voice commands.
- Note: It is recommended that use of a 1-way between the instructor/guide to the VI skier provides more control with the VI skier by the instructor/guide as opposed to using 2-way communication.

Auditory Cues by Tapping your Ski Poles

- Tapping ski poles can provide a constant connection for the VI skier to cue on.
- Tips:
  - Although not widely used, this technique is best used for B1 (no vision) VI skiers and when the (lead) guide is guiding from the front either skiing forward or backward facing the VI skier, depending on the situation.
  - Using that technique, the VI skier can determine where the sound is coming from and which direction to go. This technique allows constant auditory connection between the VI skier and guide, and saves the (lead) guide's voice.
  - Caution: As a guide, be aware that other skiers on the hill may tap their poles as a warning device in high-traffic areas, which potentially may lead to confusion on the part of the VI skier. Use this technique at your discretion in these situations.

Beeper

- May be an integral part of skiing for low vision B2s and B1s.

Ski Tips Connectors

- Connected to the ski tips to stabilize the tips of the skis and to promote proper ski position when learning basic wedge turns to stop and turn.

Body Harness with Tethers

- Sometimes used when the VI skier has other intellectual, developmental or physical balance challenges.
- The use of this aid promotes control of speed and turns shaped by the (lead) guide for the VI skier.

VI Training Goggles

- For CADS program training sessions, the use of a variety of VI training goggles is highly recommended. These simulated-vision goggles are best introduced inside the lodge. **Caution should be used with guide training with these vision-restrictive goggles as they should be paired with sighted guides for safety purposes;** some guides may feel nauseous, may experience a loss of usable balance when using these goggles. To minimize the risk of accident with the skiing public, when using training goggles, it is recommended that eyes be kept open at all time to minimize loss of balance and nausea.
  - Ski goggles can be altered to promote VI such as: blacked out with pinhole opening to simulate restricted field of vision and distance; blacked out with scattered openings to promote scattered field of vision; totally blacked out (B1 - no vision); and fully taped (clear scotch tape) to denote very low-usable vision (B1 and very low B2).
- It is very important for guides to experience what it is like to be visually challenged or blind in order to apply this experience to both guiding and teaching techniques. As an example, you may go to the VisionSim mobile app which stimulates different VI conditions as well as an explanation of each.
- An additional resource for the instructor is the CNIB eyesight simulator www.cnib.ca/en/your-eyes/eye-conditions/eye-connect/Pages/EyeSimulator.aspx

Teaching Technique

This section is divided into two sub-sections. The first sub-section is devoted to "Guiding Techniques" which provides a safe learning and skiing environment. The second sub-section presents "Teaching Ski Techniques".

Guiding Techniques

Guiding a VI skier, especially one totally blind (B1), is one of the most challenging aspects of being an adaptive instructor/guide. It is an ongoing process, through which the VI skier (participant) and the instructor/guide learn from each other's capabilities and desires.

In circumstances where there is only one guide for the VI skier, it is important that the CADS Para Snow Sport program provide the best matching of guide/instruction experience and personality to the VI skier in order to provide a better ski learning experience.

Tips:

- Before going up the hill, it is a good idea to review the section "Teaching Aids" to plan communication strategies and directional commands, lift-line procedures, and emergency procedures in on hill guiding situations including the Alpine Responsibility Code (Appendix 3).
- The importance of "sound" and how a VI skier relies on hearing to navigate should not be neglected. The guide should ask what the VI skier hears in various environments. By verifying and discussing both environmental sounds and visual shadows this will put the VI skier in a more confident frame of mind which is more conducive to learning and enjoyment of the skiing experience.
- For VI skiers who have acquired more advanced skiing techniques, as a guide, take a warm-up run on a beginner hill to get comfortable with each other before proceeding to steeper, more challenging terrain. This allows time to warm up, to ski at a slower pace and get the commands in place, and also, determines/confirms if the VI skier's visual field is what you've been told and/or assessed.
- If your VI skier has skied before then, he may have cues to which he is used to and prefers on a ski hill. This gives you time to learn them and also suggest different guiding cues that you find useful.
- Emergency Guiding Situations: As part of the communication and safety process between the instructor/guide and the VI skier, there should be "emergency guiding" procedures in place whereby
  - The VI skier immediately "STOPS" when there is a longer than normal gap in communication with the instructor/guide, or
  - If the instructor/guide raises their voice with higher inflection of "STOP" then this is the code for an "emergency stop".

Types of Guiding

Inside the lodge

- Depending on the needs of the VI skier, determine whether the skier needs verbal directions and/or physical cues to circulate within the lodge.
- If the VI indicates that physical assistance is required, then when walking with a VI skier:

  - Let the VI skier stand next to you and hold onto your elbow (cupping technique) while staying about a half step behind.
  - When moving your elbow forward, the VI skier will walk forward; when moving your elbow to the right, the VI skier will move to the right, and so forth.
  - You may also wish to incorporate verbal communication when going around people or obstacles.

  - For a totally blind VI skier, another option is to have the VI skier place a hand on your shoulder as you walk inside the lodge.

- It is very important to make sure to ask the skier on their preferred way for us to provide assistance and to use it whenever possible.
- Tip: Don't push or pull the VI skier around and don't leave the VI skier standing alone, without anything to hold on whenever possible.

Corrals and lift lines

- As a guide, depending on the lift-line environment and the VI skier's visual ability, you may use independently or in combination, voice-directional commands, the use of your elbow or hand-on-shoulder techniques.

Catwalks and transitional terrain

- Similar to corrals and lift lines, and depending on the lift-line environment and the VI skier's visual ability, as a guide, you may use independently or in combination, voice-directional commands, the elbow or hand on the shoulder techniques.
- The use of a pole as a lead can also be used to guide the VI skier. Applying minimal pressure to the right or left pole (coupled with some verbal directions) will assist the VI skier in moving in the desired direction.

Guiding from the front (ski instructor skiing backwards)

- This is the position you will likely guide/teach from with new skiers.
- This position allows the guide/instructor to stay downhill, control the speed, and turn shape of the VI skier as well as maintain good voice contact.
- Tips:
  - Always be aware of the surroundings when sliding backwards.
  - Be well-positioned, be able to perform a hand guiding (skiing backward) without transferring unwanted movement from his own ski to the VI skier's hand. All this while able to assess and develop (detect and correct).
  - Training tip: Take every opportunity you can to practice skiing backwards. The more comfortable you are with it, the better it will be when it comes to teaching and guiding in this style.

Guiding from the front (ski instructor skiing forward)

- This technique is generally used by advanced skiers, racers and by VI skiers with residual vision that can be used.
- As the guide/instructor, you must turn your head over your shoulder to project your voice and to establish visual distance between yourself and the VI skier to ensure proper spacing.
- Because of the skill level of the VI skier, you are inevitably moving faster than a novice resulting in more expert skills required by the guide/instructor to ensure trust and confidence with the VI skier.

Guiding from behind (ski instructor skiing forward)

- This position allows your voice to be heard well, allows a good visual vantage point to observe the VI skier and the crowd on the slope above and below you.
- This is used mainly with skiers with a complete loss / minimal vision that are skiing confidently and in control.

Adaptation for guiding: Use of second "blocker" guide

- When guiding VI skiers, it is recommended that CADS programs, when at all possible, devote two guides to the VI skier (2:1 ratio). Advantages include:
  - Being the best risk-management mitigation strategy to provide a safer learning/teaching environment for both the VI skier and the "lead" guide while providing a training environment to ease the less experienced "blocker" guide into the art of guiding without feeling anxious or rushed into the "lead" experience.
  - Allows for a "lead" guide/instructor to be in total control of the guiding experience (including all verbal and non-verbal commands) for the VI skier while the silent "blocker" guide is positioned up-hill behind the "lead" guide and VI skier.
  - The "blocker", positioned up-hill of the "lead" guide and VI skier, anticipates the turns of the VI skier and skis across the hill in order to block up-hill traffic; acts as the blocker to the skiing public should the VI skier fall and lose a ski, which requires the "lead" guide to put the ski back on; or, can also be a messenger to seek assistance should the VI skier fall and require medical attention from a Ski Patrol after assistance.

Horse and Buggy

- Although, not commonly used, it can be used once your VI skier has shown the ability to do at least wedge turns.
- Use bamboo poles at hip level to indicate direction change by a slight twist of the pole, or turn initiation by pushing on the left side to turn right, and so forth.
- Tip: This technique may promote unwanted hip rotation, so be sure to use only it on a limited basis.

Teaching Ski Techniques

CADS follows the Canadian Ski Instructors' Alliance (CSIA) methodology (hyperlink to CSIA Canadian Ski Teaching Manual www.snowpro.com/downloads/manual/enu/) on student learning ski techniques for progression with adaptation techniques for VI skiers.

Skiing can be analyzed and developed using a set of 5 fundamental skills:

- Stance and Balance (centered mobile stance)
- Timing and Coordination (timing of the turn and coordination of the movements)
- Pivoting (steering with the lower body)
- Edging (balancing on the edges)
- Pressure Control (skier's ability to load and unload the skis by balancing against turning forces and/or using muscular efforts)

These skills exist for all skier types and determine the success of any skier in a given situation. As a teaching and coaching tool, skill development is used to assess performance, to prioritize student needs and to develop strategies for improvement.

Skiing can be assessed using the 3 basic competencies –

- Centered and Mobile Stance (Is your VI skier centered and mobile or are they stiff, rigid, unstable, too far forward or too far back?)
- Turning with the lower body (Does the lower body lead the turning effort? Or do the hips or shoulders twist in the direction the VI skier wants to turn?)
- Balance on the edges (Is the VI skier able to grip the snow, does the VI skier lack the ability to control turn-shape and speed control?)

Use the competencies as an assessment tool, and then look to develop skiing skills that are needed to achieve the competency that needs attention.

Factors that can influence your teaching decisions include:

- Assessment of your VI student (visual impairment, fitness, confidence, fatigue and equipment),
- Consideration of terrain (know your terrain and use it well),
- Assessment of basic competencies (Is the student centered and mobile? Are they turning with the lower body? Are they balanced on their edges?),
- Choice of development tactics (prioritize which basic skill(s) can best achieve the desired objective or competency),
- Evaluation of progress (tangible results achieved by the VI skier, terrain and skiing skills),
- Guided mileage for skill development (consolidates progress and builds VI skier confidence).

CADS VI Instructor Tips:

- The best teaching advice is to have short and clear commands with action words.
- This will allow you to think about adaptive techniques to correct and improve skiing ability.
- Sometimes, correction is not directly related to improper skiing technique but rather the motor skills inabilities. Be open and receptive on thinking outside the box. You may have to do some exercises that will improve specific motor skills!

The following lesson plans have been adapted from the **Outdoors for all Foundation** website publication "Outdoors for All Volunteer Manual" as they reflect excellent examples and progression techniques which are in line with both CSIA and CADS methodology.

Step 1: Introduction to Equipment

Goals

- **Develop familiarity with the equipment**
- **Suitable guiding method introduced**
- **Create a bond of trust with the student**

Goals	Teaching Tips	Exercise
Take time to know your student and create a bond of trust.	First time skiers are often nervous – a fun and relaxed approach helps put students at ease. The VI skier may have no idea what to do – be directive, keep explanations clear and simple.	
Introduce the equipment and allow the student to feel the equipment.	Introduction to equipment can start indoors and then progress to flat terrain on snow. Explain functional aspects and safety features. Tip: Gloves on when feeling edges of skis, eye protection.	Show your VI skier the boots and how the buckles work. Show your VI skier the skis, warning of sharp edges. Show your VI skier their bindings. Practice getting in and out of skis.
Allow the VI skier to gain a good understanding of how the equipment works.	When introducing skis for the first time, keep the technical talk to a minimum. When the VI skier goes from skidded turns to carved turns, then start to talk about ski technology.	Always perform it inside first then outside. When outside, check the bottom of the VI ski boots and remove all excess snow before clicking into the bindings. As a guide, you may have to kneel down and face the VI skier from the side and have the VI skier place a hand on your shoulder while assisting him when placing his boots into the bindings if unable to coordinate this movement.
Stance and Balance	When outside, check the bottom of the VI ski boots and remove all excess snow before clicking into the bindings.	Try putting on and taking off the skis.
Teach appropriate body position – neutral, athletic stance.	Bend in the hip, knee and ankle joints. This will most likely require touching the VI skier and moving the body into the correct positions. Ask first and explain what you are doing!	Demonstrate the appropriate fore and aft and lateral body positions promoting a centered balance. Walking and hopping in the boots will show the student that the ski boots are not rigid and can flex.
Discuss with the VI skier about the guiding methods to be used.	Consider terrain and weather conditions as well as crowds on the slopes and then choose the most effective means of guiding for these environmental conditions.	Take time to set up equipment properly to ensure that VI skier is balanced over a flat ski.
Explain the Alpine Responsibility Code.		

Step 2: Basic Mobility on Snow (Skis Off/Skis On)

Goals

- **Build confidence with mobility on flat terrain with skis off and then skis on**
- **Develop balance**
- **Introduce pivoting and edging**

Teaching Tips

- ***Don't be afraid to spend extra time on the flats!*** Run through all of the movement patterns in the safe environment before moving to stepper terrain.
- Remember to use proper guiding techniques agreed to with your VI skier while walking around the ski area.
- Hands on holding will probably be necessary. Remember; be sure to tell the VI skier (where and why) before touching him and seek permission.
- First-time VI skiers often lean backwards putting them out of balance. If the VI skier is in the "back-seat" encourage student to feel their shin touching the front of the boot to help create a more centered stance.
- In the beginning use "toes and heels" instead of "tips and tails."

Description	Stance & Balance	Pivoting	Edging
With skis off, promote small steps to keep mass over feet.	X		
Emphasize for side step and for walking around in circles. Look for active "inside leg" steering even when walking around.	X	X	X
Talk about feeling the whole foot when walking around on the flats.	X		
Walk around in boots.	X		
Practice getting in and out of bindings.	X		
Walk around with one ski on. Follow the leader and then switch feet. Promote small steps to keep the mass over the feet. Allow the student to feel the ski slide in the snow. When student is comfortable, swap the ski and walk around on other leg. Follow the leader if chosen guiding technique allows.	X	X	

Description	Stance & Balance	Pivoting	Edging
With two skis on, walk and push around on the flats. Encourage VI skiers to keep poles outside their feet and hands held at hip height.	X	X	
Turn around on the spot: tips together then tails together. Emphasize rotating with the foot at the center to develop Pivoting skills.	X	X	
Introduce side-stepping and "herringbone" as a method of climbing up gentle slopes. TIP- If the VI skier has difficulty gripping the snow then encourage use of ankle and knee to develop edging skills.	X	X	X
Pole along to propel on the flats.	X		
Herringbone and sidestep to gain elevation.	X	X	X
Introduce the wedge position as a method to control speed and stop on gentle slopes. Use your VI skier's hands as needed to show ski position.		X	X

Step 3: Gliding and Stopping

Goals

- **Focus on Balance**
- **Build VI skier's confidence when gliding and stopping on the snow**
- **To be able to stop on command using a wedge**
- **To be able to control speed through use of a gliding wedge**

Teaching Tips

- Choice of terrain is important. A gentle slope with a flat run out is ideal.
- Maintain close contact and a confident voice tone.
- Try to work in quiet areas away from noisy crowds.
- Describe everything that is new to the VI skier, including the slope, the sounds, and the chairlift.
- As the VI skier becomes more comfortable, increase speed and length of the straight run.
- Review how equipment is fitting now that the VI skier has spent some time in it.
- Hands forward will help keep the student out of the back seat. Emphasize ankle, knee and hip flex for the relaxed athletic stance that keeps one over the soles of their feet and in balance.
- Review wedge position from walking around drills. Use your VI skier's hands as needed to show ski position.

Description	Stance & Balance	Pivoting	Edging
Use herringbone or side-stepping to walk up a gentle slope. When student is ready - have them glide down the slope with their skis straight. Encourage a mobile, athletic stance. Good terrain choice will allow the VI skier to stop naturally without using a wedge.			
Adopt a centered stance with proportional bending of all joints.	X		
Straight run glide to a natural stop.	X		
Once comfortable gliding in a straight run, encourage the use of the wedge to stop. Use static drills to "spread the snow" into wedge, then add to the straight run.	X	X	X
Minimal for straight run and increased with braking wedge. Experiment with opening and closing the wedge and ask student to notice the difference in speed as the wedge is opened.	X		
Straight run with steps to turn out right and left to stop. Emphasize leg steering to step out turns.	X	X	X
Traversing, traversing with small steps, traversing with sideslip	X	X	X
Ask the VI skier to hold a gliding wedge in which the speed is controlled - not increasing or decreasing	X	X	X

Step 4: Individual Turns (on beginner hill)

Goals

- **Learn to turn left**
- **Learn to turn right**
- **Develop pivoting and edging relative to the terrain, steepness of the slope and speed of travel**
- **Continue to develop stance and balance**
- **Introduction to linked turns**

Teaching Tips

- Do not rush to move to different terrain or the chairlift until the VI skier can comfortably make turns and stop. The same terrain that has been used for the straight run will be used for introducing turning.
- Use consistent guiding commands to promote timing, rhythm, and flow of the directional changes through verbal commands. Use verbal cues to vary the size of the turn radius.
- Use verbal cues when introducing turning that promote pivoting and turning with the lower body such as "point your toes to the left".
- Be aware of the size of your VI skier's wedge when introducing turning – If far too small, your VI skier may have difficulty with speed control, difficulty finding balance, and may lack the natural edge angle created by having the skis in the wedge. If far too big, the VI skier may have difficulty pivoting and can result in the edges "locking" in the snow.
- Adapt the pace of your lesson to the ability of your VI skier. Most VI skiers will need to stay in a wedge to learn how to turn; however, if you have a very confident and athletic individual, then you may be able to teach the VI skier to link turns or even to turn in parallel straight away.
- As needed, use the VI skier's hands (with permission) to show the position of the skis and how they will be turning.
- Promote good steering effort with focus on steering smoothly and continuously through the turn.
- As confidence and the success rate improves, invite the VI skier to start a little higher and go a little faster.

Description	Stance & Balance	Pivoting	Edging
From a straight run in a gliding wedge, introduce a slight direction change. Ask the VI skier to maintain the wedge but point it in the direction you ask.			
After the VI skier has achieved a slight direction change one way; try the same slight direction change in the other direction.	X	X	X
Gradually get the VI skier to turn more and achieve a rounder turn in the each direction. This can be achieved through stronger pivoting skills and through balancing on the outside ski (i.e. balancing on the left ski when turning right and balancing on the right ski when turning left).	X	X	X
Fan progression - allow the VI skier to become comfortable with turning uphill to slow down and stop. Repeat on both sides.	X	X	X
Garlands - focus on either repetitive linked turn initiations or repetitive linked finishing the turns. Repeat on both sides.	X	X	X
Use tactics / drills as needed to achieve a controlled turn. Airplane turns can be used to correct "tipping" onto the inside ski and to achieve better balance on the outside ski. "Hands on outside Knee" can be used to correct upper body rotation and to help promote stance and balance and pivoting skills. TIP: A blend of pivoting and edging creates direction change. In a wedge, a natural edge angle is created; the pivoting technique is the skill you need to develop. If your VI skier is turning and pivoting the skis well in a wedge, but the ski is not gripping in the snow and there is no change of direction - check that the boots are tight enough (if too loose, there will be no natural edge angle). If boots are tight enough and there is still no change in direction, then ask the VI skier to put their weight more on the inside of the feet so that the ski tips create the slight edge angle needed to turn the ski. Repeat on both sides.	X	X	X
Ask the VI skier to follow your tracks in a gliding wedge.	X	X	X
Through visual and verbal cues or in combination with a sensitive (hands on) cue, demonstrate how leaning forward and looking downhill starts a turn with the skis moving towards the fall line, and how returning to neutral position helps end a turn with the skis moving across the fall line.	X		

Description	Stance & Balance	Pivoting	Edging
Introduce turn linking. Encourage the VI skier to release the grip from the outside ski and to centre their weight in the transition between turns and then, to turn their toes/legs in the new direction. Use any drills/ tactics that help to re-center the VI skier in the transition such as small hops or bouncing.	X	X	X

WITH HANDS

WITHOUT HANDS

TURN TO THE LEFT

SLOWING DOWN

TURN TO THE RIGHT

Step 5: Linking Turns

Goals

- **Introduce VI skier to parallel skiing**
- **Link "wedge" turns (Wedge before the fall-line and parallel after the fall-line).**
- **Link two turns then multiple turns**
- **Control speed using turn-shape rather than the use of the wedge**
- **Experiment with changing the turn-radius and speed (short and long turns)**
- **Continue to develop the Technical Reference**

Teaching Tips

- Use consistent verbal commands and demonstrate using your hands. Use hands on the VI skier to put the body in the correct position, but remember to ask permission or verbalize "touch" and explain what you're doing and why.
- When introducing a new skill, choose terrain for success.
- Encourage the VI skier to match skis into parallel at the end of the turn, as confidence and skills increase then try to match their skis earlier in the turn.
- When introducing parallel skis – faster speed on flatter terrain is more successful than slower speed on steeper terrain.
- Explain WHY it is important for a skier to develop the ability to ski in parallel – less muscular effort, the ability to explore more terrain and to ski at greater speeds in control.
- A smooth and round turn-shape will set your VI skier up for success.
- Note: Repeat as necessary until the VI skier is able to control their speed and maintain a centered mobile stance through multiple linked turns.

Description	Stance & Balance	Pivoting	Edging
Link two turns (minimal terrain): Use the same set up as with single turns, but instead of the VI skier turning to a stop, have the VI skier begin to turn the skis in the opposite direction when they feel the speed decreasing from the first turn. Continue through the second turn, steering to a stop. Repeat as necessary until the VI skier is able to control their speed and maintain a centered mobile stance through both turns.	X	X	X
Serpentine/wiggle turns: Using the same shallow terrain as above, challenge your VI skier to link serpentine turns, but staying further in the fall line (so the VI skier's skis get a little change of direction both ways without coming all the way across the hill). Note: When skiing more in the fall line, the VI skier will travel faster, so make sure that they have the ability to stop before trying this movement.	X	X	X
Linked multiple turns: Have the VI skier proceed to linking turns with the skis coming more across the fall line. At this stage, start to encourage the VI skier to go higher up the slope and try new terrain. As with all terrain progression, make sure the next challenge / terrain choice is achievable for the VI skier.	X	X	X
Use drills/tactics to develop stronger balance on the outside ski. Lifting or tapping the inside ski is a great tactic to force the VI skier onto the outside ski at this stage. Create edge angles with foot, knee, and hip.		X	X
Promote the turn in the hip socket. Illustrate by having the VI skier lift one leg and then turn their leg and foot to the right or left and ask them to feel the leg turning in the socket. We then steer our legs in the direction we want to go.		X	
Gentle leg contact with boot cuff. Start to experiment with vertical movements and how that affects turn initiation and completion. Pressure control movements are more about the pressure that is exacted against the bottom of the ski by the snow and how to absorb and use it in the turn or in bumps etc.	X		
Explain and show how turn-shape can control speed rather than the size of the wedge. Using a J shaped turn in each direction (holding the turn until you stop) show the VI skier how speed is controlled. Use strong directional commands to help the VI skier turn the correct amount.	X	X	X
Balancing on the outside ski and the inside ski is a result of speed and balance which determines when the skis are parallel.	X	X	X
Skating on the flats, push using poles.	X	X	X

Step 6: Turn Progression and Beyond

Goals:

- **Complete parallel turns (using various speed, turn shape, terrain and balance) to build confidence**
- **Explore new terrain**
- **Introduce pole-plant**
- **Continue to develop the Technical Reference**
- **Experiment with changing the turn-radius (short and long turns)**

Teaching Tips

- Assess terrain and snow conditions when planning the lesson. Look for ways to ensure success, while challenging the VI skier.
- Be aware of the dynamic balance ability of the VI skier and adjust your lesson as needed.
- Use appropriate guiding methods at all times.
- Assess your VI skier using the basic competencies and then, choose a skill to develop to achieve the desired competency.
- A smooth, round and un-rushed turn-shape will set your VI skier up for success
- Once a VI skier is linking turns on beginner terrain (beginner area and easy-green runs) progress to increasing the speed, steepness, and variability of terrain and ski performance.
- At this level of skiing, the objective is to improve and refine skiing skills to enable the skier to maintain balance while steering their skis in a smooth, rounded arc, to adjust the turn shape relative to steepness and speed control, and introduce skills such as pressure control, timing and coordination.
- Below is a table of drills, exercises, and performance outcomes that relate to VI skiers at this level.
- **NOTE:** Make sure all exercises and tactics used remain achievable for your VI skier's skill, confidence and mobility levels.

Progression Steps

Description	Stance & Balance	Pivoting	Edging
Use drills/tactics to develop stronger and earlier balance on the outside ski. Experiment with lifting the inside ski. The result should be that both skis are parallel above the fall line.	X	X	X
If inside ski hangs up or a step is needed to match skis, promote inside ski tip and knee lead into the turn. A smooth, round turn shape will also help.	X	X	X
Encourage simultaneous edge change in-between turns. Side-slipping, hockey stops and rollerblade turns are good drills to develop the edging skills that are needed for parallel turns.	X	X	X
Garlands can be used as needed to focus on either turn initiation or turn completion.	X	X	X
Introduce a pole-plant to help with timing and co-ordination of movements.			
Work with parallel turns to refine the VI skier's balance on edges.	X	X	X
Experiment with different turn-shapes, speed and different terrains as student's skills develop. Aim to challenge the VI skier while ensuring success. Short turns, Long turns, rhythm changes, steeper terrain, un-even terrain, etc.	X	X	X

Here is a proposed check list that you can use to follow your VI skier's progression:

Progression Checklist	No	Partially Able	Yes
Centered mobile stance at all times… Is the VI skier centered and mobile at all times?			
Steering coming from the legs… Does the lower body lead the steering effort?			
Balance… Is the VI skier balanced on their edges?			
Focus on the timing and coordination of movements to carry momentum from one turn to the next. Is there a smooth transition between the turns?			
Steering / pivoting… Is the steering smooth and continuous throughout the turn?			
Different turn shapes … Is the VI skier able to change the turn radius?			
Speed control … Is the VI skier able to stop by turning across the fall line on both sides?			

Lift Procedures

This section is primarily devoted to chairlift loading and unloading, as these are the most common lifts used by ski areas. The goal is to help VI skiers learn how to ride the chairlift safely and with minimal physical and verbal queuing.

The use of other lifts (i.e. pomas or platters, t-bars, etc.) should be based on the level of the guide's experience, weather conditions, and comfort zone as well as based on the VI skier's level of skiing ability and degree of sight. All of these factors should be weighted and discussed with the VI skier before agreement and an attempt is made on one of these other lifts.

- If agreement is accepted to try one of these lifts, verbally walk the VI skier throughout the loading, uphill on snow experience (whether with the guide, on the t-bar or independently, on a platter or poma lift) and the unloading process.
- It is critical that the bottom and top lift operators are aware and are involved in this process.

Keys to Chairlift Loading and Unloading Success:

- **Before entering the chairlift lineup maze**
  - As a guide, you should have a mental picture of the unloading area and whether the unloading is done from left, the right, or straight ahead as this will determine which side of the chair the guide(s) and VI skier will sit on r when loading.
  - If the unloading area has the hill access on the right, it is recommended that the guide be on the left side of the VI skier in the event physical assistance is required to direct the VI skier towards the top of the next ski hill entry point.
  - At the same time before entering the maze, the guide may wish to use this time to verbally walkthrough or review the loading and unloading procedures with the VI skier and describe if it is a double, triple, quad or 6-packs type chairlift. Reverse process when on the other side.
- **Moving through the chairlift lineup maze**
  - Guides will determine the proper position as to whether the guide or VI skier is on the left or right side of each other; then, move the skier through the lineup maze with verbal commands to move ahead, turn, and to get into position for the upload.
  - Verbal commands for maneuvering through the lift line include examples such as: "tips left", " tips right", "straight forward"' "slide", "shuffle", or use of the "clock" system.
  - If required, in addition to verbal commands, the guide may also use the elbow technique or hands of the VI skier on the guide's shoulder (if totally blind) to move through the lineup.
  - Another useful technique is for the guide to hold onto the VI skier's poles just below where the VI skier is holding their pole and then walk through the chairlift maze. This allows arm-to-arm contact (physical guiding) and immediate physical communication to the VI skier to stop or move forward.
- **Loading the chairlift**
  - Should involve communication with the ski-lift operator for possible assistance at both the bottom and the top of the chairlift in the event that the lift needs to be slowed down or stopped. Never assume the ski hill staff knows or remembers what you need.
  - The (lead) guide should assist the VI skier with verbal communication, and if required, provide physical assistance using the elbow technique to maneuver into the loading area.
  - Once properly aligned in the load area, the (lead) guide should get the VI skier to crouch slightly and reach behind the knees with one free hand to meet the oncoming chair. Use a "3-2-1 sit" type command to sit

down on the chair; when the chair is adequately high enough off the ground, lower the safety bar on the chair.

- Remind the VI skier to try not to retrieve an item that has been dropped (e.g. a ski pole or a glove). Leave it for the chairlift operator to send up.
- If a second guide is assigned, this guide could be used to carry the VI skier's poles, if they pose a loading problem.
- The (lead) guide could use either their poles or their arm across the chest of the VI skier to ensure the VI skier is seated properly on the chair.

FOCUS ON THE VI SKIER HANDS TOUCHING THE CHAIR LIFT

- **Use of the ride up the chairlift**
  - If first time on a chairlift, review with the VI skier what worked; provide the skier with your views of the loading experience as the (lead) guide and what could be done to enhance on the next attempt.
  - For the first time chairlift experience of the VI skier you may be guiding, use this ride up the lift as a means to assess the VI skier to determine if he is anxious (nervous) or apprehensive in order to get him in a positive and confident frame of mind for the chairlift exiting procedure. Normally, anxiety can be decreased if you say what is going to happen using a calm voice. Ask them to repeat. Make them remember a "key word" associated with an upcoming movement they will have to perform.
    - As you move closer to the top, review the unloading procedures, which are similar to those for a sighted skier.
    - Because the VI skier cannot see the unloading area, describe the pitch of the ramp and which ways to turn after skiing down it.
    - If you have a second guide, use this guide to drop behind the off load and, if required, get the attention of the top ski-lift operator to stop the lift if a fall occurs, or to block and re-direct traffic away from the lead guide and the VI skier.
    - Instruct the VI skier to stay down in the event of a fall during the unloading to prevent being struck by a chair.
- **Unloading off the chairlift**
  - As a (lead) guide you should be aware of the preparation time required to get the VI skier ready to unload; prepared to determine if the top ski hill lift attendant is required for assistance.
  - As you approach the top chairlift exit station, prepare your VI skier with the lifting of the safety bar; use verbal commands to align the skis for the touchdown, the timing of the rise from a seating position (i.e. "Your skis will touch down in 3-2-1 and stand up..."); and the run-off on skis to a safe area away from the chair, to stop and safely be out of the skiing public's way.

- **Tips:**
  - Something simple as "nose over toes" can promote a balanced stance and successful dismount.
  - Use a firm forward motion to rise out of the chair.
  - Upon exiting the chair with a ***beginner VI skier***, you may need to use the modified-elbow technique and possibly use a slight brushing of your ski to direct the VI in the proper turning direction, away from the chairlift. This technique uses your outside hand to grasp the VI skier's hand closest to you and then using your other hand (closest hand to the VI skier) to take hold of the back of the VI skier's elbow in order to establish and maintain their balance and to physically guide or steer him.
  - By way of example, if you are exiting to the right, the (lead) guide would be on the left side of the VI skier and would use his the left hand to grasp the VI skier's left hand; then, the right hand would be used to take the back of the VI skier's left elbow to physically assist the VI skier with the right turn direction, and if need be, to also use the (lead) guide's right ski to gently push the VI skier's left ski which promotes a right turn.
  - If terrain permits, a straight run to a wedge stop can also be used.
  - Once the VI skier progresses from being a "new beginner" who is now able to control sliding, turning and stopping independently without physical assistance then "normal" chair unloading can be applied. It is recommended that proper guide/

VI skier seating position be kept in mind in the event assistance might be needed.

- Another "chair unloading" example could be the use of ski poles, which the (lead) guide places across the hip/chest area for the VI skier to grasp onto while exiting the chairlift.

Throughout the exiting procedure it is important that the (lead) guide communicates with the VI skier.

SEQUENCE MOVEMENT: UNLOADING A CHAIRLIFT

9.2 - 3 Track

Overview:

3 Tracking is the adaptive ski technique used when an individual skis on one ski with the support of one stand-up outrigger attached each arm. This name originates from the fact that the skier leaves three tracks in the snow. Most commonly used by Above-Knee Amputees (AK) skiing on one leg with the prosthesis removed.

The 3 Track method can also be used by (but is not limited to):

- Single Below-Knee Amputees (BK) skiing without the prosthesis;
- Polio, post polio, or people who ski on one ski;
- Double-leg amputee (one side above knee AK + one side BK) skiing on one prosthesis on the BK amputation side (NOTE: this is very rare and due to the pressures and stresses caused by skiing and only having the use of two joints; permission / recommendation from a medical professional should be sought before proceeding. (Sitskiing would be another option for an individual with this type of disability).

NOTE: It is important to note that with the advancement in prosthesis design, AK amputees may be able to use a prosthesis to ski on two skis. This should only be done if the prosthesis is designed to be used as a ski leg, and if so, progression and ski techniques would be the same as stand-up skiing with two skis and two ski poles or 4 Track skiing if the skier requires additional support due to balance issues.

Assessment of Abilities:

When skiing, stress and pressure are applied on the lower joints. This is obviously increased for a 3 Track skier who has to support his weight and the forces and pressures created when skiing with fewer joints. With this in mind, it is important to determine the level of strength, mobility and endurance of any potential 3 Track skier Therefore, it is important to perform the AOT process to better understand the strength and weaknesses of your skier.

Each instructor must have gone through the Medical Sheet prior beginning the AOT process

AOT process:

While aware of an individual's specific disability, ask questions relating to abilities.

Ask

Ask	Look for
What other sports does the individual participate in?	Sports that require balance, strength and mobility and some motor skills ability so it could be transferred into skiing.
Does the person think of themselves as fit and active? If so, why?	The ability to correctly self-evaluate.
Have they used any other specialized adaptive sports equipment?	Sports that could be related to skiing as well as adaptive equipment.
Has the leg amputation occurred because of a diabetes complication?	Fatigue, blood sugar level, hypothermia, lost of sensitivity (pain, temperature, etc.) Fatigue Chart is located in the Appendix 10.
Has the person skied before?	Prior ski experiences could lead to a faster ski progression.
What does the skier think their strengths are?	Perseverance, participation in other sports, positive attitude, determination.
Are they comfortable removing and not using their prosthesis in public?	The individual confident/ at ease with removing the prosthesis. If not, then further stress the importance of risk of injury to the residual limb or damage to the prosthesis.
How long can the individual stand unaided on their one leg?	This is an indication of endurance and strength levels.
How has the person overcome challenges related to his amputation?	Creativity with answers and perseverance.
Do they participate in a physiotherapy or a kinesiology treatment program?	Why does he participate and would it have an impact on his skiing.

Observe

Watch the individual as he walks and moves around. As you do this, relate the ease of movements to mobility requirements related to skiing

Observe	Look for	Relate to skiing
Is the individual well-balanced while moving around?	Unsteadiness, lack of balance, lack of confidence.	The more unsteady the individual is, the more reliant he will be on outriggers for support, balance and turning.
Is the individual looking for additional support to assist movements?	Uses of chair, walking aid, wall or person.	
Does the individual move with ease with the prosthesis on and off?	Ability to move easily	The more at ease the individual is with movements, the better the ability to balance can be expected throughout the ski progression.
Are movement patterns quick or slow?	Quick movement patterns Slow movement patterns	The quicker the movements, the greater the confidence. This can have an effect on lesson pacing as someone that is more steady and mobile will find balancing on a ski easier and therefore, would learn more quickly.
While moving around does the individual display an ability to separate movements between upper and lower body?	Uses the upper body to assist the movement of the lower body. Ability to separate movement of upper and lower body.	The ability to show separation between upper and lower body movements indicates greater mobility and the ability to steer with the lower body while skiing.

Test

Do some simple mobility and strength tests that are related to the movements and level of strength that will be required for skiing. Perform these tests with both the prosthetic device on and off.

Test	Look for	Relate to skiing
Balance and Endurance	Lost of balance due to leaning or moving laterally or from a fore and aft movement, or due to instability in the torso. When the skier moves around, do you see a decrease of the ability to flex or weakness on one side or the other?	The more instability due to balance when standing , the more reliant on the outriggers for support, balance and endurance. If a weakness appears after a certain period of time, deterioration may be observed of the ability to perform certain manoeuvres correctly.
	Ability to stand unaided for at least 5 minutes on his non-prosthetic leg without losing balance or getting fatigued. After the test, ask the skier to evaluate fatigue level using the Fatigue Chart in the Appendix 10.	During the test, rapid reports of fatigue will directly impact on the relation between resting periods and reliance on the outriggers for support. Fatigue Chart is located in the Appendix 10.
Flexion and Extension	While checking range of vertical movement, focusing on the ability to flex and extend the ankle, knee and hip. Determine if balance is maintained.	This will indicate the ability to maintain a centered mobile stance. The greater the ability to do this while maintaining balance, the less reliant on the outriggers while skiing. The range of movement will also indicate the ability to control pressure at more advanced stages of ski progression.
Lateral movement	Check range of movement when rolling knee side to side and determine if balance is maintained.	This will indicate the ability to edge a ski and maintain balance while doing so.
Pivot	Ability to rotate the foot and the leg across the body while keeping the upper body still. Upper and lower-body separation. While performing test, observe if the hip and upper body rotate to assist the movement.	This will indicate the ease of the individual to steer with the lower body. The range of mobility the individual demonstrates with this test will indicate the potential to execute pivot while skiing.

As mentioned above, an individual that has an AK amputation may rarely remove their prosthesis, especially in public, and may be reluctant to do so for skiing. If the individual does not have the use of an approved prosthesis for skiing, it is our job as instructors to address the safety issues involved when skiing using a regular prosthesis. In most instances, skiing with a regular prosthesis will restrict movements, making it more difficult to turn the ski, and prosthesis is liable to get caught on the snow. Therefore, chances of injury are increased and damage to the prosthesis or residual limb may occur, resulting in slower ski progression or even termination of skiing.

The safest on snow experience must be ensured. Encourage the removal of the prosthesis while remaining responsive to the individual's concern. If the student insists on using the prosthesis, it is then advisable to suggest Sitskiing or to purchase a skiing prosthesis and learn stand-up skiing with two skis and two ski poles.

Once the AOT is complete, the student displaying a satisfactory level of mobility, strength, endurance and confidence while being comfortable removing his prosthetic device (as an above-the-knee amputee) is ready for the 3 Track experience.

Equipment:

Stand up Outriggers:

It is important to adjust the outriggers to complement the body positions that the skier is required to adopt.

Outrigger Set Up:

Most outrigger manufacturers provide full explanations on how to assemble their outrigger kits. However, three main adjustments remain essential:
1- Distance from handle to cuff (A); 2- Distance from handle to the ski (B); 3- Heel screw adjustment (C) if that option is available.

1- Distance from handle to cuff (A)

Distance from handle to cuff remains the same as explained in the Outriggers section (A)

2- Distance from the handle to the ski (B)

While standing in an upright position, the 3 Track skier must be able to brush the snow surface with the outrigger skis held by their side.

3 - Heel screw adjustment (C)

Set the screw so that, in a balanced position, the skier can barely feel the friction while skiing. Always carry the appropriate tool to adjust the heel screw as it may need to be modified. Generally, reduce the heel friction as the skier gains confidence (screw in), or increase it if the skier needs more speed control at the beginning (unscrew).

When setting the student's outriggers, one should make sure that they are set at a length that facilitates a centered, mobile stance. To do this, they must have a flex ankle, knee and hip Refer to CSIA teaching manual for more information. Once in this position, the individual requires the outriggers to be on the snow, halfway between the toe of the ski boot and tip of the ski. In this position, the skier should also have a 'relaxed' bend in their arms.

The best way to accomplish this is to have the student stand upright with no flex in any lower joint while wearing a ski boot and ski, with outriggers held at the sides. The ski of the outriggers should brush the snow.

If outriggers are too long the skier will stand taller ski and the outriggers will push the shoulders back, resulting in the skier being back on the ski and out of balance.
In addition to hindering the skier's performance and progression, it will also result in the skier having to over-use the quads muscle for support resulting in a quicker onset of fatigue. Fatigue Chart is located in the Appendix 10.

The way the equipment is adjusted can have a major effect on the skier's success . For your development as an instructor, take any opportunity you can to practice with the outriggers at different lengths, and observe how they assist or hinder your ability to 3 Track.

It is also important to notice that the length of a 3 Track skier's outriggers may change as skills progress. In beginner stages, the skier will tend to use the outriggers more to help assist with balance; as the skier's skills and confidence increase, use of the outriggers will be less for support. At an advanced level of skiing, a 3 Track skier may shorten outriggers for more support for lateral balance, and less for fore and aft balance. At advanced stages the 3 tracker may go to the use of standard ski poles

Ski and Binding:

Ski size and length is consistent with a regular ski set up in relation with skill and performance level. The binding should be set by a ski technician.

Ski Boot:

Fitting is standard relative to foot shape, size, skier weight and performance level.

Teaching Aids:

- Chair / bench for regular rests in beginner stages

Teaching Techniques:

When 3 Tracking, the progression can be very rapid. This is because, with only one ski, the wedge turn is removed from the teaching progression. Once a skier gains confidence and is well balanced on it's ski (centered mobile stance) while moving, the rate of progression is enhanced as the movements, remain consistent, only the speed and the terrain change.

The teaching progression for a 3 Track skier should follow CSIA teaching methodology whenever possible. When 3 Tracking, the three skiing competencies to examine are the following:

1) Centered, mobile stance;
2) Balance on edge;
3) Steering with the lower body.

Beginner:

While doing a basic mobility test in detail is strongly advised for the skier to build a good foundation with regard to familiarity with the equipment, stance and balance, confidence while sliding and stopping. We need to be aware that this process can be very tiresome for the skier. Ensure that a chair or bench is available for regular rest stops.

Step 1: Introduction to equipment

Goals

- **Develop familiarity with the equipment**

After having set and adjusted the outriggers, the skier may already have difficulties maintaining a centered, mobile stance. Here is a brief list of possible problems.

Assessment / Observation	Possible Origin / Reason	Development - Solutions
Leaning too far forward. Bent forward at the waist.	Outriggers lengths (B) are too short.	Lengthen outriggers.
Leaning too far back. Outrigger skis are too far forward of the ski bindings.	Outriggers lengths (B) are too long.	Shorten outriggers.
Leaning to the side. One shoulder higher than the other.	Outriggers are different lengths.	Make outriggers the same length.
When the outriggers are in ski position and held in the correct place, the outriggers' skis cannot stay flat on the snow and the heel create unwanted drag.	Heel (C) is too long.	Shorten the heel screw (C).
When the outriggers are in ski position and held in the correct place, the outrigger skis stay flat on the snow; But when heel are needed, the skier has to lean forward sacrificing balance to engage the heel friction.	Heel screw (C) is too short.	Lengthen the heel screw (C).

Step 2: Basic Mobility

Goals:

- **Familiarization with the ski boot and outriggers in motion**
- **Build confidence with mobility with Ski off and then with ski on.**
- **Develop skill: balance**
- **Introduce pivoting**

NOTE: If a skier is unable to perform some or all basic mobility exercises, you may consider the use of a sitski.

At all times while moving, the skier's residual limb should remain pulled in and next to and aligned with the skiing leg, to promote proper body alignment, a good natural stance, and to protect from injury during a fall.

Description WITH SKI OFF (on flat terrain)	Stance & Balance	Pivoting
Outriggers with skis in Crutch / Upright Position: Have the skier walk / hop around using the outriggers heel for support. Walk in a circle both clockwise and counter-clockwise.	X	X
Have the skier do little jumps on the snow in his boot.	X	
Have the skier flex their ankle, knee and hips to bend as low as possible and then straighten all joints to be as tall as possible.	X	
With support have the skier pivot the foot from right to left, trying to point the toes from one side to the other.		X
Demonstrate to the skier and have him copy a centered, mobile stance; standing on with flexion in their ankle, knee and hips.	X	

Step 2: Basic Mobility - Troubleshooting (On snow but without ski)

Assessment / Observation	Possible Origin / Reason	Development - Solutions
When walking and/or jumping, the individual loses balance and falls backwards.	The student is under flexing at the ankle relative to the knee and hips forcing hips behind heels or too straight up and leaning back with the upper body.	Flex ankle, knee and hip joints equally while walking/jumping.
When walking and/or jumping, he loses balance and falls forwards.	Over flexing is occurring at the ankle, knee and hips. Or the individual flexes too far forward at the hips.	Flex ankle, knee and hip joints equally while walking/jumping.
When walking, balance is lost to the side.	The foot is not directly underneath the body causing a lean to one side or the other.	Have the individual try little hops so that the foot is placed underneath the body for balance.
When trying to point the foot across the body, the heel is pushed out rather than pivoting the foot.	Heel is displaced to the side.	Promote the turning effort coming from pointing the toes rather than pushing out the heel. Promote the pivoting effort from turning the leg into the hip socket.
When flexing ankle, knee and hip joints, the skier falls forward.	Over flexing at the ankle, hips or waist.	Flex ankle, knee and hip joints equally to obtain centered stance. Use a mirror or picture to help realize the correct body position.
When flexing ankle, knee and hip joints, backward fall results or a sitting position results.	Insufficient flex at the ankle relative to the amount of flex at the knee and hips.	Flex ankle, knee and hip joints equally.

NOTE: if the skier is displaying many of these problems and is unable to correct the outcome, they may be better off to try sitskiing.

Description WITH SKI ON (on flat terrain)	Stance & Balance	Pivoting	Edging
Outriggers in the Crutch Position: Have the skier slide forwards and backwards using the outriggers to propel.	X		
Have the skier hop on the snow.	X		
Have the skier hop and turn the ski from one side to the other while in the air.	X	X	
Using the outriggers for support, have the skier pivot the ski from side to side on the snow while keeping the ski flat.	X	X	
Have the skier try to lean from side to side, using the outriggers (crutch position) to support / balance him/ herself themselves while executing this lateral movement. Observe how the individual executes this movement, can they move the knee laterally, or just the hip, either together, or even maybe not at all?	X	X	
Outriggers in the Ski Position: Repeat all of the above exercises with the outriggers in a ski position. To do so, the individual outriggers need to be turned outwards, so the outrigger skis are pointing away from the skier on both sides. This angle creates a platform to push off from.	X	X	X

Step 2: Basic Mobility - Troubleshooting (on snow, ski on and flat terrain)

Assessment / Observation	Possible Origin / Reason	Development - Solutions
While sliding on the snow and/ or hopping, the skier is falling / losing balance backwards.	Over flexing at the knee and not enough at ankle and hips, creating a sit back position. Positioned too vertical on the leg.	Flex ankle, knee and hip joints equally to maintain a centered and mobile stance.
While sliding on the snow and/or hopping, the skier is falling / losing balance forwards.	Over flexing at the ankle and/or hip.	Flex ankle, knee and hip joints equally to maintain a centered and mobile stance.
While sliding on the snow and/or hopping, the skier is falling/losing balance to the side.	Unbalanced laterally.	Make sure the ski is directly underneath the torso. Check the outriggers (B) length to be identical.
While hopping, the skier is leaning to far forwards / backwards.	The ski tip is staying in the snow while hopping (too far forward) or the tail of the ski is staying on the ground while hopping (too far back).	Have the skier try to hop getting the whole ski off the ground at equal height, both tip and tail.
The skier is unable to pivot the ski on the snow as the edges are catching.	The ski is not flat on the snow.	Have the skier try to balance on a flat ski without using outriggers for support,

Step 3: Gliding and Stopping (Slide on Flat Terrain / Terrain Assisted Stop)

Goals:

- **Confidence with sliding in a straight line**
- **Maintain a center and mobile stance while sliding**
- **Maintain a proper outriggers position while sliding**
- **Side Step up Hill**
- **Perform a terrain assisted and heeling stop**

Description	Stance & Balance	Pivoting	Edging
Have the skier use the outriggers to push so that the ski glides on the snow.	X		
The skier should maintain a centered, mobile stance to a stop on the flat terrain.	X		
Have the skier focus on the outrigger ski tips gliding on the snow, one on each side of the ski, halfway between the toe of the ski boot and the tip of the ski.	X		

Picture above shows the correct position for the outrigger ski tips to be in while sliding in the snow through beginner phase. For assessment and development, if the outrigger skis tips are leveled with or in front of the ski, it will result in the skier's weight being too far forward. If the outrigger ski tip is leveled with the ski boot, then this will result in the skier being too upright or leaning back.

Description	Stance & Balance	Pivoting	Edging
Side Step up Hill (minimal gradient): The skier positions the ski directly across the fall line with outriggers at each side (in ski or crutch position, crutch position being easier). The skier lifts the ski, using the outriggers for support, and moves it up the hill, keeping it directly across the fall line. Repeat this action until you reach the desired height on the slope. Beyond helping with basic mobility, this exercise also introduces edging and balance on the edge of the ski.	X	X	X
Slide Down Slope: to Terrain Assisted Stop: Make sure that the terrain you use has a minimal gradient and flat run out at the end. If the appropriate terrain is not available, go to the next heeling stop section below. After side stepping up the slope, the skier, using the outriggers positioned across the fall line, moves their ski to point down the hill. Have the skier focus on the outrigger ski tips gliding on the snow, one on each side of the ski, halfway between the toe of the ski boot and the tip of their ski.	X	X	X
Terrain Assisted Stop: When ready to start sliding, the skier turns the outriggers to face down the hill and then starts sliding. The skier should maintain a centered mobile stance to a stop	X		

Description	Stance & Balance	Pivoting	Edging
Heeling Stop Technique, using outriggers: This is done by applying pressure to the heel of the outrigger by a flex of the ankles, knees and hips while pushing the outriggers forward towards the tip of the skis. If the 3 Track skier is unable to flex the ankle and knee, the same result may be achieved by extending the arms to increase the pressure on the outrigger heel's on the snow, causing them to slow to a stop.	X		
Slide on Flat Terrain/ Heeling Stop: As above but this time, the skier uses the heeling technique to stop. This is done by applying pressure to the heel of the outrigger by a little flex of the ankle, knee and hip while pushing the outriggers forward towards the tip of the ski.	X		
Slide Down Slope to Heeling Stop: When ready to start sliding, the skier turns the outriggers to face down the hill and starts sliding and stop using heeling technique. The skier should maintain a centered mobile stance to a stop.	X		

Once the skier is comfortable and confident with the above steps, move to working more on stance and balance and on the first basic skier competency, the centered mobile stance.

Description Slide Down Slope with Hop to Heeling Stop	Stance & Balance	Pivoting	Edging
When ready to start sliding, the skier turns the outriggers to face down the hill and then starts sliding down the hill and tries to do a little hop then stop by using heeling technique. The skier should maintain a centered mobile stance until they naturally come to a stop. If the skier maintains a centered mobile stance when hopping, the whole ski should come equally off the ground. If the tip of the ski is staying on the ground when hopping, the skier is too far forward; if the back of the ski is staying on the ground and only the tip of the ski is lifting up, then the skier is leaning back.	X		
Slide Down Slope with Hop and Flex to Heeling Stop			
When ready to start sliding, the skier turns the outriggers to face down the hill and starts sliding down the hill and does a little hop. To increase the challenge, have the skier bend / flex equally ankle, knee and waist after doing the hop and stop by using heeling technique. The skier should maintain a centered mobile stance	X		

If the terrain does not allow for a safe progression from a slide to terrain assisted stop or heeling stop, then modify the progression accordingly, try a modified version of the drill in a traverse.

At this stage and relative to the skier's Endurance levels, be as creative as possible making the lesson fun while continually working on stance and balance while maintaining a flat ski, the skier having as little reliance on the outriggers as possible. For example, while sliding down the slope in a straight line, have the skier lift both outriggers.

Step 3: Gliding and Stopping - Trouble Shooting

Assessment / Observation	Possible Origin / Reason	Development - Solutions
While sliding, the skier is out of balance (too far forward).	The skier is over flexed at the ankle, waist or both.	Focus on flexing ankle, knee and hip joints equally to maintain centered mobile stance.
While sliding, the skier is out of balance (too far back).	The skier is over flexed at the knee joint and/ or too upright in the hip.	Focus on flexing ankle, knee and hip joints equally to maintain centered mobile stance.
While sliding, the skier is unable to keep the ski flat on the snow.	The skier is on the edge or the ski is wobbling from edge to edge. Lateral balance is lacking.	Encourage the skier to keep the ski directly under the torso. Make sure that outriggers run on the snow with equal distance between skis, on each side.
While sliding and trying to keep the outriggers running on the snow, the shoulders and upper body are being pushed back.	The screw on the outriggers is too long causing too much resistance	Shorten the heel screw.

Step 4: Individual Turns

Goals:

- **Single Turn to Stop in both directions,**
- **Develop pivoting**
- **Develop edging**

NOTE: It is harder for a 3 Tracker to turn on the uphill side of their skiing leg. Ex.: if you are skiing using your right leg then your right turn will be more difficult.

To set the student up for the greatest success, it is important to have him/her as confident as possible in maintaining balance with the ski flat on the snow. When the ski is flat on the snow, there is less resistance when the ski is pivoted (the action of the turning the ski in the direction of travel).

Description	Stance & Balance	Pivoting	Edging
Single Turn (on downhill ski) to Stop On flat terrain, have the skier stand on a flat ski and using the foot to steer in both directions to practice the feeling of pivoting the ski and the femur turning in the hip socket. Please note, if the 3 Track skier is unable to pivot the foot due to mobility issues, get them to have the steering effort come from the lowest functioning part of the body.	X	X	X
Have the skier start on a small slope and straight run down the hill; at a given point, the foot and ski are pivoted across the body (i.e. if skiing on the left leg, turns will be to the right and vice versa). The skier keeps turning the ski across the fall line to a stop.	X	X	X
Have the skier focus on steering, starting with turning the foot continuously throughout the whole turn.	X	X	X
As confidence and success improves, encourage the skier to move to a higher uphill position to increase speed slightly.	X	X	X
Single Turn (on uphill ski) to Stop: Repeat as above with skier turning in the opposite direction	X	X	X
Adaptations and Advancements to this Drill: Have the skier try to the same drill with outriggers off the snow or with as less as possible weight on the outriggers . This drill is intended to lessen reliance on the outriggers while the steering is coming from the lower body.	X	X	X

MOVEMENT SEQUENCE TO CHANGE DIRECTION FROM A PERPENDICULAR POSITION FROM THE FALL LINE TO FACING THE FALL LINE

Remember that we are following CSIA teaching progression and methodology where possible. Encourage the skier to maintain a centered mobile stance, with the steering effort coming from the lower body.

Movement sequence right turn

Adaptations and Advancements to this Drill:

If possible and safe, have the skier try to do this with the outriggers off the snow; this drill is intended to lessen reliance on the outriggers while the steering is coming from the lower body.

Movement sequence

Step 4: Individual Turn - Trouble Shooting

Assessment / Observation	Possible Origin / Reason	Development - Solutions
The skier is unable to pivot the ski.	The ski is on edge and not flat on the snow.	Work on maintaining a centered mobile stance with ski directly underneath the COM.
The skier is over rotating at the end of the turn.	The skier is leading the turning effort with the upper body and outriggers.	Have the skier work on turning effort coming from the lower body while maintaining a centered mobile stance.
The skier's ski is sliding out at the end of the turn.	The skier is too far forward on the ski.	Have the skier work on finding the centered mobile stance where they are centered on the ski, enabling the whole ski to grip the snow as they turn.
The skier is having trouble initiating the turn even though the ski is flat on the snow.	The skier might be too far back on their ski.	Have the skier work on finding the centered mobile stance where they are centered on their ski, enabling the whole ski to grip the snow as they turn.
The ski stays flat on the snow while turning and slides down the fall line at turn completion.	The skier is leaning into the turn with their upper body only, which is often easy to see if the outside outrigger lifts up off the snow.	Work on the skier staying centered over their ski while turning. Focus on steering coming from the lower body. Encourage the skier to keep their outside outrigger on the snow throughout the whole turn.
You are teaching the skier to turn by pointing the outriggers and upper body in the direction of the turn.	They are over rotating at the end of the turn.	Teach the skier to turn the ski by steering with the lower body, not the upper

Step 5: Linking Turns.

Goals:

- **Link Two Turns**
- **Link Multiple Turns**
- **Continue to develop the Technical Reference**
- **Experiment with changing the turn-radius and speed (short and long turns)**

Description	Stance & Balance	Pivoting	Edging
Link Two Turns (minimal terrain): Use the same set up as with single turns, but instead of the skier turning to a stop, begin to turn the skis in the opposite direction as soon as they feel the speed decreasing from the first turn. Continue through the second turn, steering to a stop. Repeat as necessary until the skier is able to control their speed and maintain a centered mobile stance through both turns	X	X	X
Serpentine / Wiggle Turns: Using the same shallow terrain as above, challenge the skier to link turns while staying more in the fall line (so the skier's ski gets a small change of direction both ways without it coming all the way across the hill). Note that when skiing more in the fall line, the skier will travel faster so, make sure that the skier has the ability to stop before trying this manoeuvre.	X	X	X
Linked Multiple Turns: Progress the skier to linking turns with the ski steering more across the fall line. It is at this stage the skier should be encouraged to try more challenging terrain. As with all terrain progressions, make sure the next challenge or terrain choice is safely achievable for the student.	X	X	X

Step 5: Linking Turns - Troubleshooting

Assessment / Observation	Possible Origin / Reason	Development - Solutions
The skier is leaning into the hill while turning, resulting in being out of balance. The outside outrigger is coming off the snow while turning.	Instinctively wants to lean into the turn. Leaning on the uphill outrigger. Unbalanced laterally	Make sure outside outrigger stays on the snow while turning, allowing the skier to remain balanced over the ski.
The skier is struggling to commit to the next turn.	Coming to a stop at the end of each turn.	Try the same drill on shallower terrain. Give verbal command on when to start steering into the next turn.
The skier is unable to pivot the ski into the next turn.	The ski is not flattening at the end of the turn.	Work on flattening the ski by releasing the edge with the lower joints to initiate the new turn. Remember to promote the three stages of the turn: 1) Flattening the ski, 2) Pivoting the ski in the direction of travel, 3) Edging relative to the terrain, and steepness of slope and speed of travel.

Step 6: Turn progression and Beyond.

Goals:

- **Continue to develop the Technical Reference**
- **Experiment with changing the turn-radius and speed (short and long turns)**
- **Experiment and build confidence with different speeds, terrain and snow conditions**

Once a 3-track skier is linking turns on beginner terrain (beginner area and easy-green runs) progress to increasing the speed, steepness, and variability of terrain and ski performance.

At this level of skiing, the objective is to improve and refine skiing skills to enable the skier to maintain balance while steering the ski in a smooth rounded arc, to adjust the turn shape relative to steepness and speed control, and introduce skills such as pressure control, and timing and coordination.

Below is a table of drills, exercises, and performance outcomes that relate to 3 Track skiers at this level.

NOTE: Make sure all exercises and tactics used remain achievable for your 3 Track skier's skill, confidence and mobility levels.

Intermediate 3 Track	Stance & Balance	Pivoting	Edging	Pressure Control	Timing & Coordination
Lifting outriggers off the snow at the start of every turn. *See picture below*	X				
Tapping the inside outrigger as while turning, maintaining the outside outrigger on the snow outrigger on the snow.	X		X		
Side slipping on both sides.	X		X	X	
Jumping/hopping at the initiation of the turn.	X			X	X
Jumping/hopping all the way through the turn.	X	X	X	X	X
Counting through the turns (1,2,3) 1 = at the start of turn, 2 = at the fall line, 3 = through completion.					X
Singing while skiing.					X
Flexion and extension.	X			X	X
Rollerblade turn.	X		X		
Spiess / jump turns.	X	X	X		
Hockey stops.	X	X	X	X	X
Short turns.	X	X	X	X	X
Skiing faster on green runs. See movement sequence below	X	X	X	X	X
Skiing steeper terrains.	X	X	X	X	X
Skiing around trees on green runs.	X	X	X	X	X
Skiing on varied surfaces (choppy snow and small bumps).	X	X	X	X	X

Sequence movement: Left Turn

This checklist can be used to follow a 3 Track skier's progression:

Checklist	Unable	Partially Able	Able
Centered mobile stance at all times.			
Steering from the lower body / establishing body separation			
Both outriggers staying on the snow, about halfway between the ski boot and ski tip.			
Flattening of ski to initiate pivot and the new turn.			
Steering being smooth and continuous throughout the turn.arc			
Confidence with different turn shapes.			
Being able to stop by turning across the fall line on both sides.			

Monitor fatigue as well as recuperation capacity.

Ensure that regular rest stops are taken and have a chair / bench available. The muscular energy expenditure in the single leg is very high and recuperation capacity may vary from a few minutes to a day and more.

Progress towards using ski lifts as soon and as safely possible (when the 3 Track skier is in control on the desired pitch/slope) instead of walking up hills. Using ski lifts is less fatiguing, therefore, promoting a more enjoyable skier experience.

Fatigue Chart is located in the Appendix 10.

Ways to Manage Fatigue:

- An upright stance can be less tiring, by using the skier's skeletal structure for support. Though this will decrease the fatigue of the skier, a more upright stance locks up the skier's lower joints therefore making it tougher to steer the ski with the lower body.
- While skiing, encourage maintaining a centered mobile stance to promote an athletic ski position and an ability to maximize the movement of the lower-body joints, standing straight up only to rest and take some stress off the muscular system.
- Have the skier to stop and rest as needed on the side of the run.

Falling Safely:

- To minimize potential injury when falling, ensure that when the skier is about to fall, the outriggers are raised off the snow and across the body down the hill. This minimizes the chances of the outriggers getting caught and causing damage to skier's arms and shoulders.
- Whenever possible, teach / encourage the skier to keep the residual limb tucked in while falling, to minimize the chances of it getting caught on the snow and avoid groin or hip injury.

Ski Lift Procedures:

Magic Carpets:

Outriggers should be down in the ski position while riding the magic carpet so that the skier can rest them on each side of the magic carpet, and to assist as needed with balance while not getting caught.

It is advised to keep the use of surface lifts, as magic carpet lifts, to a minimum when possible due to the increase of fatigue of being on one leg for long periods of time, and the pressure caused from traveling up hill. Fatigue Chart is located in the Appendix 10.

If there is no choice but to use the magic carpet, fatigue might set in; consider having a folding chair to allow rest periods.

MOVEMENT SEQUENCE

T-Bars and Poma / Button Lifts:

When riding surface lifts, the outriggers should ALWAYS be in the down ski position to assist as needed with balance. It is advised to keep the use of surface lifts like T-Bars and Poma / button lifts to a minimum when possible, due to the increase in fatigue caused by being on one leg for long periods of time, and the pressure caused when traveling up hill. Also, it might be difficult for beginners or skiers with a very small residual limb to use these lifts. Fatigue Chart is located in the Appendix 10.

Be aware of spacing on a T-bar with two skiers both using outriggers and sharing a lift; there is a danger that the two inside outriggers of each person might get caught. It can be done, but ensure that an outrigger user is comfortable using the ski lift before doubling up with another outrigger user.

Chairlift:

Chairlift loading procedures are in line with standard able bodied chairlift loading procedures. Before the skier sits down on the chair, ensure that the outriggers are down in the ski position, are lifted up in front of the skier while sitting down, to avoid the outrigger of getting caught under the chair.

It is recommended to put the safety bar down only once the ski is a few feet above the snow to allow clearance in the event of a sudden stop of the chairlift.

It is recommended to teach your 3 Tracks skier to extend their residual leg out from under the chair when loading. So outriggers and leg are up and in front.

9.3 - 4 Track

Overview:

4 Track is the adaptive ski technique used when an individual skis on two skis with the support of two outriggers, one on each arm. The term comes from the four tracks left on the snow by the skier.

4 Track skiing can be the most challenging to teach due to the diversity of individuals that can ski in this manner. The progression and teaching methods used are different and vary greatly from one skier to another depending on the mobility and balance levels of each. This challenge is in fact an opportunity to find out what the skier IS ABLE TO DO as it is to find out how his ABILITY TO SKI can be maximized.

4 Track skiing is most commonly used by individuals with mobility and/or balance issues / weaknesses in their lower limbs and/or trunk, who are able to stand and walk with or without the use of walking aids. For example, people with:

- Cerebral Palsy.
- Spina Bifida.
- Multiple Sclerosis.
- Double-below-knee amputee.
- Above or below-knee amputee, skiing with a specific skiing prosthetic leg, but still requiring additional support.

The use of the outriggers allows the skier to support him/herself, assist with balancing, turning their skis and sliding on the snow safely.

Assessment of Abilities

Because the ski teaching techniques / progression and the lessons are chosen and planned for an individual's specific needs, it is fundamental to know what their capabilities are. The best way to find out is to test mobility, balance, coordination, strength and endurance in order to see how their body can move and achieve the movements that we require for skiing.

Understanding the skier's mobility and strength levels is essential to working with and adapting to these capabilities in order to experience the greatest success on the snow.

Each instructor must have gone through the Student Medical Sheet prior beginning the AOT process.

The focus is on:

1. How the skier can best maintain a centered mobile stance,
2. Pivoting, how the skier can get their skis /feet /lower body to change direction, and
3. Edging, how the skier can best move laterally while staying balanced to enable the ski to edge on the snow.

Ask

While aware of an individual's specific disability, ask questions relating to abilities.

Ask	Look for
What other sports does the individual participate in?	Sports that require balance, strength and mobility and some motor skills ability so it could be transferred into skiing.
Does the person think of themselves as fit and active? If so, why?	The ability to correctly self-evaluate.
Have they used any other specialized adaptive sports equipment?	Sports that could be related to skiing as well as adaptive equipment.
How long can they stand / walk with support?	Gauging their endurance level will guide how you will pace the lesson.
Have they skied before?	Prior ski experiences could lead to a faster ski progression.
Where do they think their strengths are?	Perseverance, participation in other sports, positive attitude, determination.
What common challenges do the individuals face?	Limited movement, fatigue, balance, coordination, lack of belief in themselves and /or their ability, frustration with their disability etc.
How did the skiers overcome these challenges?	If the skier has successfully overcome these challenges, ask how he did it. Look for creative answers and perseverance.
Does he participate in a physiotherapy treatment program?	Why does he participate and would it have an impact on his skiing.

Observe

Watch the individual as he walks and moves around. As you do this, relate the ease of movements to mobility requirements related to skiing.

Observe	Look for	Relate to skiing
Is the student well-balanced while moving around?	Unsteadiness, lack of balance, lack of confidence.	The more unsteady the individual is, the more reliant he will be on outriggers for support, balance and turning.
Is the student looking for additional support to assist movements?	If the person requires the use of walking aid, wall or person.	
Is one side of the body stronger and / or moves easier than the other?	Weakness originates from the legs, trunk or upper body or a combination of the above.	Weakness on one side will affect the turning ability, making one turn more difficult. Weakness in the core muscles will affect lateral, fore and aft balance. Weakness in the upper segment of the body (i.e. arm) will affect the ability to use the outriggers on that side.
Does the student have mobility in the joints?	Flexion Rotation Pronation	Greater mobility of the joints will facilitate a better center mobile stance.
How much does the individual rely on a walker, walking aids while standing? When walking, are movements of the upper body used to move the lower body?	Walking aids while standing or moving.	Increase use of the upper body to move the lower body may result in unsteadiness and increase the reliance on the outriggers for support, balance and turning.
How is the student's gait?	Alignment of feet, point out/in, The alignment originates from spine, hips, knees or ankles.	If the foot is pointing out, it may indicate the need for the use of a ski bra to promote the ski tips working together. If the feet are pointing in, the wedge turn will be easier but parallel skiing more difficult.
Is the student limping?	Weakness or restricted mobility on one side Legs are different lengths	A weakness on one side will affect the turning ability making one turn more difficult. A weakness in the core muscles will affect lateral, fore and aft balance. A weakness in the upper segment of the body will affect the ability to use the outriggers on that side. If one leg is shorter, try to consult a certified ski technician for a potential solution. This will enable the skier to maintain a more balance position on his/her skis.
While standing and moving, does he keep his body above his feet?	Leaning fore/aft or laterally	This will have a direct impact on the skier's ability to maintain a centered mobile stance.
Are movement patterns quick or slow?	Quick movement patterns Slow movement patterns	The quicker the movements, the greater the confidence. This can have an effect on lesson pacing as someone that is more steady and mobile will find balancing on a ski easier and therefore, would learn more quickly.
While moving around does the individual display an ability to separate movements between upper and lower body?	Uses the upper body to assist the movement of the lower body. Ability to separate movement of upper and lower body.	The ability to show separation between upper and lower body movements indicates greater mobility and the ability to steer with the lower body while skiing.

Test

Here are six proposed mobility and strength tests relating to movements and levels of strength that will be required for skiing that can be performed whenever possible.

Test	Look for	Relate to skiing
Balance and endurance	Is the skier losing balance due to leaning or moving laterally or from a fore and aft movement, or due to instability in the core? When the skier moves around, do you see a decrease of the ability to flex or weakness on one side or the other?	The more instability due to balance while he/she is on his/her feet, the more reliant will be the skier on his/her outriggers for support balance and endurance If weakness appears after a certain period of time, you may notice a deterioration of his/her ability to perform correctly what he/she was used to do.
	Can the skier stand aided by his/her equipment for least for 1 minute without losing balance or getting fatigued? After the test, ask on a scale of 10 how do they evaluate it (1=no fatigue and 10= exhausted)	The less fatigue showed during the test will directly impact the relation of maintaining skiing between resting period and less reliant on his/her outriggers.
Flexion and extension	Check range of / and ability for vertical movement, focusing on the ability to flex and extend the ankle, knee and hip. How easy is it for the skier to stay in balance while doing so? Check if some joints move easier than others while doing this; does he/she compensate by over-flexing one joint as the other is limited?	The more ability to flex lower joints a skier has, the more athletic stance the skier can use. The less flexion a skier has in the joints, the more upright position the skier will need to remain centered on his/her skis. If the skier is able to move one joint easier than the other, it affects his/her ability to stay centered on a fore and aft movement. If the ease of movement is in the knee joints, the skier will lean back when he/she flexes, and if the skier is able to flex the ankle or hip further, this will result in being in a more forward ski position.
Laterally	How much range of movement does the individual have with his/her knee and hip from side to side? While doing so, can he/she stay balanced? Using an aid for support (e.g. wall), how far can the skier lean to one side? If the skier is unable to move his/her knee laterally, Identify what part of the body makes the lateral movement possible.	This will impact on how you will introduce the skill of edging into the ski lesson. For example: if the skier is unable to move his/her knees laterally but can with his/her hip, then you can teach the skier to use that movement to edge.

Test	Look for	Relate to skiing
Pivot	Have the individual try to lift one leg and pivot his/her foot from side to side (keeping the upper body still, trying to point his/her foot across each side of the body). Can the skier isolate this movement to his/her lower body only (ability to create upper and lower body separation) or does he/she use his/her hip and upper body to assist or lead / support the movement? If the skier can move his/her foot to the side a little bit, can he/she move it more to the side if supported by turning his/her hip, or shoulder in the required direction?	If the skier can pivot from his/her foot that is the movement to use to teach turning, if the movement comes from the knee, then you will use pivoting from that joints as well as with the hip and upper body.
Wedge turn	Is the individual able to pivot his/her feet to make a wedge turn… and how does he/she perform it? If not, have the skier sit down on a chair and see if he/she can make a wedge shape twisting his/her feet. Should that not work, have the skier sit on the ground with their legs out straight up front and see if the individual can make a wedge shape by twisting the femur in the hip socket.	The ability to make a wedge turn is not essential for a 4 Tracker to progress, but if he/she is able to move in this way, then you will obviously try to include it in your progression. If not, then you should leave it out and move on to turning to stop after you have practiced the heeling technique.
Agility	Have the individual walk in a circle in both directions. Examine how he/she naturally maintains and achieves the change in direction. For example, does he/she lift one leg and turn his/her foot in the direction of travel? Does he/she lead the movement with the knee, or hip, or shoulder and then the lower joints / limbs follow?	By identifying the joints that are leading the movement and creates the change of direction, you have also found the joints to use for teaching.

Do frequent mobility checks even with skiers with whom you have skied before. You can find that, because of a variety of factors, their mobility levels may differ from the last time you skied together. Understanding the skier's mobility and strength levels is essential to being able to work and adapt to his/her strength and experience the greatest success on snow.

Teaching Technique:

We are following the CSIA teaching progression and methodology when appropriate and relevant for 4 Track skiers.

As ski instructors, when working with 4 Track skiers, we will be encountering various challenges that originate from their mobility, strength, coordination and stamina with their lower and upper body. For us, this is a great opportunity to use our knowledge of skiing, our creativity and the individual's test results to ensure the 4 Track skier success on the slopes

Following you will find a six step-by-step guide (from outrigger use and basic mobility up to linked turns).

Ensure your skier understands how the equipment works.

Ensure that you have a chair or bench available for regular rest stops. Moreover, make sure your practice / lesson time is based on quality and not quantity.

The results of the testing from the AOT will dictate the progression of your ski lesson. For example, if your tests results show that, due to limited mobility in the ankle-knee-hip, the skier has to remain more upright in their stance to remain centered and mobile relative to their body mechanics, then this is what you would promote in the following steps one to six for the 4 Track ski progression.

With 4 Tracking, we are trying to ensure that the skier is as centered and mobile as the individual body allows. Even if the 4 Track skier cannot bend their ankles, knees, and hips equally to maintain a centered mobile stance in the CSIA sense, the individual will still be able to find a position centering the skis to the best of their ability. For example, a 4 Track skier with very limited lower body movement can still be centered on their skis by standing in an upright position, where the center of mass (COM) is directly over the base of support (BOS).

Step 1: Introduction to equipment

Goals:

- **Develop familiarity with the equipment**

After having set and adjusted the outriggers, the skier may already have difficulties maintaining a centered, mobile stance. Here is a brief list of possible problems.

Assessment / Observation	Possible Origin / Reason	Development - Solutions
Leaning too far forward. Bent forward at the waist.	Outriggers lengths (B) are too short.	Lengthen outriggers.
Leaning too far back. Outrigger skis are too far forward of the ski bindings.	Outriggers lengths (B) are too long.	Shorten outriggers.
Leaning to the side. One shoulder higher than the other.	Outriggers are different lengths.	Make outriggers the same length.
When the outriggers are in ski position and held in the correct place, the outriggers' skis cannot stay flat on the snow and the heel friction create unwanted drag.	Heel screw (C) is too long.	Shorten the screw (C).
When the outriggers are in ski position and held in the correct place, the outrigger skis stay flat on the snow; But when heel friction are needed, the skier has to lean forward sacrificing balance to engage friction.	Heel screw (C) is too short.	Lengthen the screw (C)

Step 2: Basic Mobility

Goals:

- **Familiarization with the ski boots and outriggers in motion**
- **Build confidence with mobility with skis off and then with skis on..**
- **Develop balance**
- **Introduce pivoting**

With Outriggers in Crutch Position WITH SKIS OFF (on flat terrain)	Stance & Balance	Pivoting
Have the skier walk / shuffle around using the outrigger in crutch position to support him/ herself and then, walk in a circle both sides.	X	X
Have the skier try to turn their feet / ski boots to make a wedge shape.		X
Have the skier hop (if possible) on the snow in their ski boots.	X	
Have the skier bend their ankles, knees and hips (to the best of their ability) so that they can go as low as possible and then, straighten all joints to be as straight as possible.	X	
Have the skier try to move their foot from right to left, trying to point their toes from one side to the other. It is a really important to observe how the skier uses their body to get their foot to change direction.		X

If self-propelling with the outriggers is too fatiguing for the 4 Track skier (due to strength issues) then, you can assist with propelling them along. If assisting by pushing the skier, make sure that your action is gentle and will risk getting the skier off balance.






With Outriggers in Crutch / Upright Position WITH SKIS ON (on Flat terrain)	Stance & Balance	Pivoting	Edging
Have the skier slide forwards and backwards using the outriggers to propel them forward and backwards. See pictures sequence below.	X		
Have the skier hop on the snow. This may be unachievable for the 4 Track skier, but even by trying to do the movement and although he/she may not get the skis off the ground, they will be trying to activate their body and joints in a balanced position.	X		
Have the skier try to keep their skis as flat on the snow as possible. Being able to keep the skis flat on the snow minimizes the amount of resistance when trying to turn / pivot the skis, which is essential for every skier, especially one that has to achieve this task with limited strength.	X		
Have the skier turn one ski from side to side on the snow, keeping the ski as flat on the snow as possible. Then, repeat with the other side. Remember to promote the movement being initiated from the lowest functioning part of the individual's body, and then work up as needed, engaging the bigger upper joints and outriggers only as needed.	X	X	
Have the skier try to turn their feet to make a wedge shape on the snow.		X	
Have the skier try to lean from side to side, using the outriggers (crutch position) to support / balancing themselves while executing this lateral movement. Observe how the individual executes this movement, can they move the knee laterally, or just the hip, either together, or even maybe not at all?	X		X

Slide forward Movement sequence from right to left

Note: To use outriggers to push the skier forward and back in the ski position, your skier will find it successful to have outriggers pointed inward when moving backwards and outwards to moving forwards. This angle creates a platform to push off from.

Slide backwards Movement sequence from left to right


With Outriggers in the Ski Position	Stance & Balance	Pivoting	Edging
Repeat all of the tasks in the table above	X	X	X
The skier should practice maintaining a centered mobile stance until he/she naturally comes to a stop on the flat terrain	X		

Step 3: Gliding and Stopping

Goals:

- **Confidence with sliding in a straight line**
- **Develop Balance skills while straight sliding**
- **Maintain proper outrigger position while sliding**
- **Perform a terrain assisted and stop using outriggers**

With Outriggers in the Ski Position	Stance & Balance	Pivoting	Edging
Slide on flat terrain, terrain-assisted stop Have the skier push themselves (if possible) with the outriggers so that their skis slide on the snow.	X		
Have the skier focus on the outrigger ski tips sliding on the snow, one on each side of the skis, halfway between the toe of the ski boot and the tip of his/her ski.	X		

Heeling technique:

This is done by applying pressure to the heel of the outrigger by slightly bending the ankles, knees and hips while pushing the outriggers forward towards the tip of the skis. If the 4 Track skier is unable to bend the ankle and knee, then they might be able to achieve the same result by extending his/her arms to increase the pressure on the outrigger heels on the snow, causing them to slow down to a complete stop. If they still requires a little more assistance, then he/she could bend at the hip as little as is required to create the resistance to stop.

With Outriggers in the Ski Position	Stance & Balance	Pivoting	Edging
Slide on flat terrain, with a Heeling Stop As above but this time, the skier uses the heeling technique to stop.	X		
Side Step Up Hill The skier positions their skis directly across the fall line with the outriggers by their side (in ski or crutch position, crutch position being easier). The skier lifts their skis, using the outriggers for support, and moves them up the hill keeping them directly across the fall line. Repeat this action until the desired height on the slope is reached. Due to mobility, strength and stamina issues, this may be unachievable or too fatiguing for your 4 Track skier. If this is the case, then find other ways to assist with sliding them up the hill to the desired start point.	X	X	X

With Outriggers in the Ski Position Slide Down Slope to Terrain Assisted Stop	Stance & Balance	Pivoting	Edging
After side-stepping up the slope, the 4 Track skier skis across the fall line using the outriggers positioned down the hill in a ski position with the outrigger. This will provide stability for the skier to moves their skis to point down the hill. (as shown in the sequence movement below)	X	X	X
Start sliding by turning the outriggers facing them down the hill. While doing so, the skier should maintain a centered mobile stance until they naturally come to a stop on the flat terrain.	X		
Have the skier focus on the outrigger ski tips gliding on the snow, one on each side of the skis about halfway between the toe of the ski boot and the tip of the skis.	X		
Have the 4 Tack skier perform the same drill but using the heeling technique to stop.	X	X	X
If the 4 Track skier is able to make a wedge shape with their skis perform the same drill but using the wedge to stop.	X	X	X

MOVEMENT SEQUENCE: PIVOTING SEQUENCE FROM A POSITION ACROSS THE SLOPE TO FALL LINE POSITION

HOW TO SET THE OUTRIGGERS BEFORE SLIDING DOWN FOR A STRAIGHT LINE, STRAIGHT LINE TO STOP USING OUTRIGGERS.

Once the skier is comfortable and confident with the above steps, we can start to increase the challenge, to work more on stance and balance and the first basic skier competency, the centered mobile stance.

With Outriggers in the Ski Position	Stance & Balance	Pivoting	Edging
Slide Down Slope with Hop to Heeling or Wedge Stop Only if this is achievable for the skier, perform the same drill as above but, while the skier is sliding down the hill, have them do a little hop.	X		
Note if the skier maintains a centered mobile stance, then the whole ski should come equally off the ground when hops.	X		
If the tip of the skis stays on the ground when hopping, the skier is too far forward in their stance; if the back of the skis stay on the ground and only the tip of the ski lifts up; then the skier is leaning back.	X		
Slide Down Slope with Hop and Bend to heeling or Wedge Stop As above, but just increasing challenges by having the skier bend / flex after doing the hop.	X		X

Note: the skill of edging is present through the act of side stepping up the hill to perform these tasks.

At this stage and relative to the skier's stamina levels you can be as creative as possible making the lesson fun while continually working on stance and balance, while maintaining a flat ski, and with the skier having as little reliance on the outriggers as possible. For example, while sliding down the slope in a straight line, have the skier lift up their outriggers, do a little dance, play Simon says, look up and ahead, sing a song etc.

These are just suggestions. Make sure you pick challenges / exercises that are suitable and achievable for your skier and their specific mobility levels.

Step 4: Individual Turns

Goals:

- Single left turn
- Single right Turn
- Develop pivoting and edging skills;
- Continue to develop balance skills;
- Introduction to link turns;

MOVEMENT SEQUENCE SHOWING A SINGLE TURN TO THE LEFT SKIER SIDE

To set the 4 Track skier up for the greatest success with turning, it is important to have skier as confident as possible in maintaining balance with skis as flat on the snow as their mobility and natural body position allows. As with any type of skiing, when the skis are flat on the snow, there is less resistance when the ski pivots (the action of turning the ski in the direction of travel). If the skis are on edge, or 'wobbles' from edge to edge due to the skier not being able to maintain balance on a flat ski, then it becomes harder to turn the ski in the direction of travel as the edge catches in the snow, creating more resistance. This is very important for the 4 Track skier who will generally have weakness in one or more limbs and or other parts of their body. The better the balance position and flatter the skis can travel on the snow, the easier it will be for the skier to turn / pivot.

Through all your ski teaching, whether it is adaptive or able-bodied, make sure you try to promote these 3 procedures:

1) The skis flat on the snow,
2) Pivoting the skis in the direction of travel,
3) Gradually introduce edging relative to the terrain, steepness of slope, and speed of travel.

With Outriggers in the Ski Position	Stance & Balance	Pivoting	Edging
Single Turn to Stop, Use the same terrain as step 3 On flat part of terrain and using the outriggers for support, have the skier stand with their skis as flat as possible. Use the steering effort determined earlier to steer in both directions. This is to practice the feeling of the movement to be used to pivot / turn the skis. Promote the steering effort starting from the lowest functioning part of the body, supported where needed from higher joints and turning the outriggers in the direction of travel.	X	X	X
Then, have the skier start on a little slope and straight run down the hill, at a given point they begin to turn in one direction. The skier continues to turn their skis in the same direction until they come to a stop. Have the skier repeat as necessary with the focus of the steering coming / being lead from the lowest functioning part of the body.	X	X	X
Repeat while trying to turn in the opposite direction. Continue to practice individual turns with the focus on steering smoothly and continuously through the whole turn. As confidence and success rate improves, invite the skier to start a little higher and go a little faster.	X	X	X

With Outriggers in the Ski Position	Stance & Balance	Pivoting	Edging
Teaching assessment and development strategies: If the 4 Track skier is struggling to complete the turn it could be due to a number of issues, for example • Unbalanced position on their skis. Go back to promoting sliding and staying in the centered stance that is natural for the 4 Track skier. • Skis are not flat on the snow. Examine how the skier can flatten their inside ski relative to their mobility levels and natural body position. If they do not have the strength or mobility to steer with the joints that they are using, then it might mean to try using other parts of the skiers body and or equipment to assist with the turning effort: For example: • Steering the knee in the direction of travel; • Steering the Hip in the direction of travel; • Steering the outriggers and shoulders in the direction of travel;	X	X	X

These last movements will cause more of a rotation movement to assist the turn. The CSIA promotes steering with the lower body, as rotation movements can be detrimental to ski performance.

NOTE: CADS follows CSIA teaching methodology whenever possible. It is important to remember that the 4 Track skier may not fit perfectly into this model and methodology and progression.

For example, a 4 Track skier that has limited lower-body strength and m**obility will struggle when trying to steer with their lower body. Therefore, assisting or leading the turn using the upper body (rotation) can enable the skier to turn, have control and ski to the best of their abilities.**

Just remember to try and begin the movement from the lowest functioning part of the body and work up.

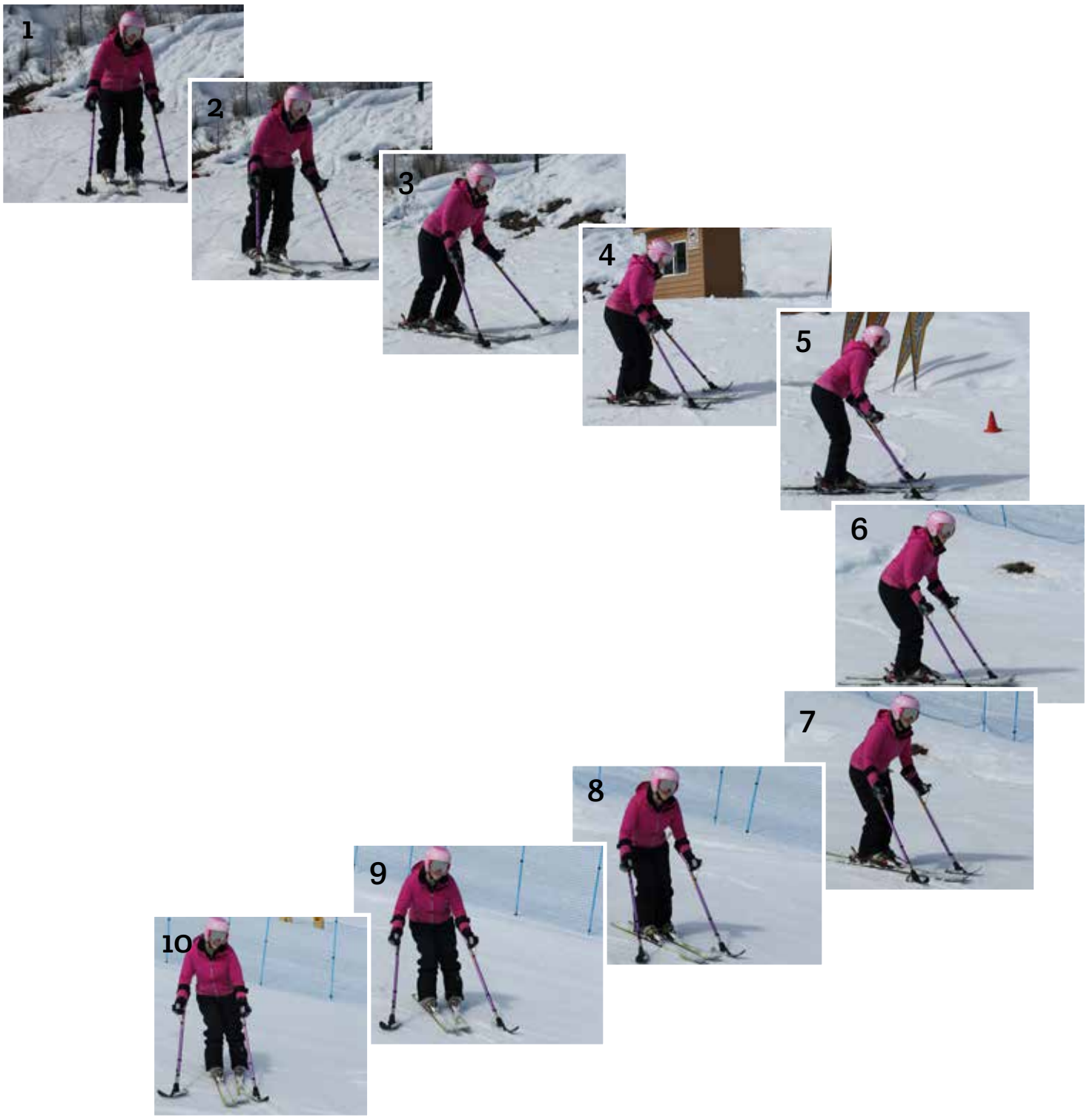
Step 5: Linking Turns

Goals:

- **Introduce skier to multiple linked turn**
- **Control speed using turn-shape**
- **Continue to develop the Technical Reference**
- **Experiment with changing the turn-radius and speed (short and long turns)**

With Outriggers in the Ski Position	Stance & Balance	Pivoting	Edging
Link two turns (minimal terrain): Use the same set up as with single turns, but instead of the skier turning to a stop, begin to turn the skis in the opposite direction as soon as they feel the speed decreasing from the first turn. Continue through the second turn, steering to a stop. Repeat as necessary until the skier is able to control their speed and maintain a centered mobile stance through both turns.	X	X	X

MOVEMENT SEQUENCE: LINKING TURS



With Outriggers in the Ski Position	Stance & Balance	Pivoting	Edging
Serpentine/wiggle turns: Using the same shallow terrain as above, challenge your 4 Track skier to link serpentine turns, but staying further in the fall line (so the skier's skis get a little change of direction both ways without coming all the way across the hill). Note: When skiing more in the fall line, the skier will travel faster, so make sure that he/she has the ability to stop before trying this movement.	X	X	X
Linked multiple turns Have the skier proceed to linking turns with the skis coming more across the fall line. At this stage, start to encourage the skier to go higher up the slope and try new terrain. As with all terrain progression, make sure the next challenge / terrain choice is achievable for the student.	X	X	X

Below (page 84 and 85) are pictures of two 4 Track skiers in a centered and mobile stance that is relative to their mobility levels, one skier has the strength and mobility to have some flexion in his ankle, knee and hip, and the other skier has very limited movement in his lower joints.

Both skiers, though their bodies work in different ways, are able to be in a centered stance relative to their mobility levels. Due his greater mobility in the lower joints, the skier in right hand side has a slightly more athletic looking stance; the skier in picture right hand side is more upright, but is still centered on his skis with his center of mass (COM) over his base of support (BOS).

SKIER WITH GREATER MOBILITY IN THE LOWER JOINTS

SKIER WITH A MORE UPRIGHT POSITION

It can be tempting if a skier that has limited movement in his ankles and knees, but can flex at their hip and or waist, to get them to flex at the hip or waist as shown in picture above. This is NOT recommended as it forces the skier to be out of balance due to his/her COM being in front of his/her BOS. This position will also add more stress on the skier's lower back.

Step 6: Turn progression and Beyond.

Goals:

- **Continue to develop the Technical Reference**
- **Experiment with changing the turn-radius and speed (short and long turns)**
- **Experiment and build confidence with different speeds, terrain and snow conditions**

Once a 4 Track skier is linking turns on beginner terrain (beginner area and easy-green runs) progress to increasing the speed, steepness, and variability of terrain and ski performance.

At this level of skiing, the objective is to improve and refine skiing skills to enable the skier to maintain balance while steering his skis in a smooth, rounded arc, to adjust the turn shape relative to steepness and speed control, and introduce skills such as pressure control, timing and coordination.

Below is a table of drills, exercises, and performance outcomes that relate to 4 Track skiers at this level.

NOTE: Make sure all exercises and tactics used remain achievable for your 4 Track skier's skill, confidence and mobility levels.

Intermediate 4 Track	Stance & Balance	Pivoting	Edging	Pressure Control	Timing & Coordination
Lifting outriggers off the snow at the start of every turn.	X				
Tapping the inside outrigger as he while turning, keeping the outside outrigger on the snow.	X		X		
Side slipping on both sides.	X		X	X	
Jumping/hopping at the initiation of the turn. (if possible for the individuals mobility levels)	X			X	X
Jumping/hopping all the way through the turn.(if possible for the individuals mobility levels)	X	X	X	X	X
Counting through his turns (1,2,3) 1 = at the start of his turn, 2 = at the fall line, 3 = through completion.					X
Singing while skiing.					X
Flexion and extension.	X			X	X
Rollerblade turn.	X		X		
Hockey stops.	X	X	X	X	X
Short turns.	X	X	X	X	X
Skiing faster on green runs.	X	X	X	X	X
Skiing steeper terrains.	X	X	X	X	X
Skiing around trees on green runs.	X	X	X	X	X
Skiing on varied surfaces (choppy snow and small bumps).	X	X	X	X	X

Here is a proposed checking list to use to follow the 4 Track skier progression:

Check List	Unable	Partially Able	Able
Centered mobile stance according to the skier's natural body position, mobility, and strength.			
Steering from the lower body ideally from the feet, which cause the femur to turn in the hip socket, when possible. If unable to initiate the turn from the feet, then progress on to promote steering coming from the lowest possible joint.			
Both outriggers on the snow, about halfway between the ski boots and ski tips.			
Steering smoothly and continuously throughout the turn.			
Flattening the skis before beginning the new turn.			
Confidence with different turn shapes.			
Being able to stop by turning on both sides.			
Monitor fatigue, promote regular rest stops and have a chair / bench available.			

Examples of 4 Track skiers

The following table highlights four common conditions that could affect a potential 4 Track skier's mobility and strength levels. The following chart indicates assessments, challenges, and solutions to promote the best teaching progressions / approaches to maximize your students potential on skis.

Each case will also propose in the assessment outcomes column, a picture that shows (in dark) affected muscles/region of the body and unaffected ones. In the case below, the picture presents leg diplegia which affect muscles of the lower extremities of the human body, usually those of the legs, hips and pelvis. Each picture is to be referred to as an example only.

Individual with some lower-body mobility having diplegia in the legs		
Assessment Outcomes	**Challenges for Skiing**	**Solutions and Teaching Suggestions**
 • Walks independently with the support of walking aids, with strong upper body but slight weakness and lack of mobility in the lower body. • Is able to bend his/her ankles knee and hip in equally. Finds that holding athletic position is fatiguing after a while and his/her balance is affected as a result. • When walking, achieves a change in direction by pointing his/her foot but supports the movement with the hip. • Is able to point his/her foot across his/her body with both left and right foot (a little) and even more with use of his/her hip. • Is able to demonstrate a little lateral movement with the knee but a greater amount with their hip.	**Centered Mobile Stance** • Due to being able to flex and extend the ankle, knee and hip, individual is able to maintain a centered and mobile stance, but fatigue appears because of the weakness in lower body and struggles to keep this position from affecting thier balance, fore / aft and lateral.	**Centered Mobile Stance** • Promote centered and mobile stance with equal flexion in ankle, knee and hip joints. • This will promote better balance by being centered on his/her skis and will maximize the mobility in his/her lower joints. • Take regular rest stops to manage fatigue • Use of outriggers (only as needed) to spread his/her weight across four points therefore reducing fatigue levels.

Individual with some lower body mobility Having diplegia in the legs		
Assessment Outcomes	**Challenges for Skiing**	**Solutions and Teaching Suggestions**
	Steering with the lower body • Though the individual is able to turn their foot and lower joints to achieve a change in direction, it is not enough to complete a full turn.	**Steering with the lower body** • The centered mobile stance of the skier will maximize the mobility of their lower joints enabling steering with the lower body to the individual's maximum potential. • The individual is able to turn and steer their lower body and have the initiation of the movement coming from the foot up. • If the skier is unable to finish off the turn due to the weakness in their lower joints, add a rotation of the outside hip (only as necessary to complete the turn).
	Balancing on edges Is able to move laterally but, due to limited lateral knee movement, struggles to angulate to maintain balance while edging through the completion of the turn.	**Balancing on edges** Move the knees laterally, then encourage more angulation from the hip to maintain balance on the edges of their skis.
• Walks with walking aids. Slight weakness in the core but with strong upper body in relation to chest and arms. • Fatigues easily due to extreme lack of mobility in lower joints and effort required to move around • When walking, achieves a change in direction by pushing and supporting with the outside walking aide, causing the upper body to lead the turning effort of the foot. • No flexion possible with the ankle joint, very little with the knee, and more at the waist. • Unable to point their foot across their body when just trying to move the foot. When using the hip and upper body to lead the movement, they are able to get their foot across his/her body to about a 45 degree angle. • Is able to move the lower body laterally a little bit but only by using their hip. No lateral movement with the knee is possible.	**Centered Mobile Stance** • Difficulty in maintaining a centered mobile stance in the traditional CSIA sense due to the lack of ability to flex the ankle and knee joints. • Tendency to bend at the hip/waist ;but, not being able to bend the ankle and knee causes the skier's COM to be in front of their BOS, resulting in the skier to be out of balance (too far forward).	**Centered Mobile Stance** • Due to the lack of mobility in the ankle and knee joints, have the individual to stand more upright in the hips. This will enable the skier to remain centered on their skis and in the most mobile stance they can, according to their mobility levels. • Lengthening the outriggers may help the skier maintain an upright, more centered stance for their mobility levels and help assist/ support the weakness of the trunk in holding this position while skiing. • With each of these, while being more upright, we are still promoting their BOS to be directly over their COM. Therefore maintaining the most centered position on their skis according to their strengths and mobility levels.

Individual with limited to no lower body mobility (For example: Walking Spina Bifida - Diplegia CP)		
Assessment Outcomes	**Challenges for Skiing**	**Solutions and Teaching Suggestions**
	Steering with the lower body • Due to weakness in the lower body, skier is unable to turn the skis using their feet and legs. • Has difficulty in keeping ski tips together, especially when trying to turn.	**Steering with the lower body** • The skier in this case is unable to steer the joints with their lower body due to very limited to no mobility in this part of their body. • To promote the best skiing for this individual, we need to encourage the steering to come from the lowest part of the body that can lead the movement. Through our assessments, we have seen that this is from the hip; so, we would teach turning coming from a rotational movement of the hip. • If the individual is unable to finish the turn with this movement, then we could look at supporting this movement from higher up, by rotating the shoulders and by turning the outriggers in the direction of travel.
	Balancing on edges Is able to move laterally but, due to absence of lateral knee movement, struggles to angulate to maintain balance while edging through the completion of the turn.	**Balancing on edges** To maintain balance on the edges of their skis the skier will have to angulate from the hip/waist area. The more edge the skier is trying to achieve, the more angulation will be required to maintain balance at slow speeds.

Individual with weakness on one side of his/her body (For example: Left or right side Hemiplegic Cerebral Palsy). Note: This example depicts an individual having a left side Hemiplegia CP		
Assessment Outcomes	**Challenges for Skiing**	**Solutions and Teaching Suggestions**
 Right side of the body functions normally with close to full strength and mobility. Left side is weaker and tighter (limited mobility) than the right. Is able to grip with their left hand but with limited strength. Is able to walk without aides but sometimes uses an aide in their right hand for longer walking trips. When walking and wanting to turn to the left, the skier is able to balance on their left side (but looks unsteady) and points the right foot where the skier wants to go. When wanting to turn right, the skier balances with good stability on the right leg and swings the left hip around to enable the left foot to point to the right. the left foot is slightly turned in (across their body) in its natural position. They are able to flex all joints on the right side but has very limited flexion with the left side of their body.	**Centered Mobile Stance** Due to only being able to flex and extend on one side of their body and not the other, he/she tends to lean to one side when they try to make an athletic looking stance as only the ankle, knee and hip joint on the right side flex, and the left side remains on upright and straight. This means that the skier loses balance laterally to the right side when they try to flex the joints on the right leg.	**Centered Mobile Stance** Have the skier maintain a centered mobile stance by straightening the right side of their lower body to match that of the left. This way, even by being more upright, they will maintain the most centered position on skis according to their mobility levels. Encourage as much flexion on the left side as comfortably possible. For longer-term development, work with a physiotherapist to increase flexibility on the weaker / stiffer left side and with a kinesiologist for an exercise plan.
	Steering with the lower body Even though the skier has full mobility and ability to steer the right leg; on the turn to the left, they find that the left ski is resisting as it is pointing in the opposite direction and they are unable to steer their left leg to the left. This causes the individual to travel straight when trying to turn to the left. When trying to turn right, they have difficulty as the left leg and foot (outside ski) are unable to steer to the right due to the weakness and stiffness of their left side.	**Steering with the lower body** To enable the turn to the left, encourage the skier to unweight the left leg/ski as much as possible while weighting and turning/pivoting the right foot and leg in the direction of travel (to the left). When turning right, due to the left foot's natural position of being turned in (pointing to right) and the left leg being stiff, all you need to do to begin a turn to the right is soften the right leg, creating more pressure on the left ski directing it the way it is pointing. To compensate for the lack of mobility of the left leg joints and to increase the steering angle to the right, have the individual rotate the left hip in the direction of travel (only as much as is needed to enable the skier to complete their turn). This will result in the skier having two separate techniques for turning right and left, but will maximize the skier's ability to perform at the best level of skiing relative to their mobility and strength levels.

Individual with weakness on one side of his/her body (For example: Left or right side Hemiplegic Cerebral Palsy). Note: This example depicts an individual having a left side Hemiplegia CP		
	Balancing on edges The weakness and stiffness on the left side makes it hard for the skier to angulate to balance on their left ski.	**Balancing on edges** The skier will be able to angulate with their knee and hip on the right side to maintain balance on the edges while turning to the left. When turning right to compensate for the weakness and lack of mobility on the left side, try to look at ways they can use their stronger side to support the movement and create the desired results. For example, by softening the right leg (inside leg of turn) when turning right and, at the same time increasing the pressure on the right outrigger on the snow, it will make the skier angulating on their left side, maintaining balance on the edge of their ski through the completion of the turn.
• Recent injury has caused the double below- the-knee amputation. • The individual can walk without the walking aids and is getting stronger, more confident and better balanced from day-to- day. • When walking longer distances, will occasionally use walking aids to assist with balance and fatigue. • They have full flexion in the knee and hip but their prosthesis has little to no flexion in the ankle joint. • the skier is able to point their foot (on both sides) across their body by turning the femur in the hip socket.	**Centered Mobile Stance** Due to their prosthesis and the stiffness of their ski boot, the ankle joint is locked in one position and unable to move. Because of the missing feet, the individual is unable to reference pressure points across each foot that would indicate a balanced position.	**Centered Mobile Stance** According to the fixed angle of the prosthetic in the ankle joint, play around with flexion of the knee and hip to find the most centered and mobile stance for the skier in this case. The more the skier bends their knee, the more they will have to bend their hip to stay centered. Note that over flexing of the knee and hip while lowering the COM resulting in greater stability can also have the negative effect of limiting mobility of the lower joints. To compensate for not being able to feel the pressure across their feet, which associates with being in a balanced position on their skis, you can give a visual cue. For example: shoulders, knees and toes aligned and hips and the back of their binding etc. Promote the use of outriggers for support only as needed to support balance and combat fatigue. Due to the mobility and strength of this skier and their rapid improvements with being able to balance and use their prosthetics, their aim would be to use ski poles instead of outriggers over time.

Individual with weakness on one side of his/her body (For example: Left or right side Hemiplegic Cerebral Palsy). Note: This example depicts an individual having a left side Hemiplegia CP		
	Steering with the lower body The individual is unable to feel the pivoting effort from their feet due the prosthetics on both sides, making it harder for the steering to come from the feet.	**Steering with the lower body** Even though this skier has lost the mobility of their ankle joints, they can still create steering coming from the lower body by focusing on the steering coming from the knee and femur turning in hip socket.
	Balancing on edges Due to not having ankles or feet, it is hard for a skier to feel the movements for edging coming from this part of their body.	**Balancing on edges** As above but the skier will be able to move laterally and remain balanced on their edges by angulating with the knees and hips.

RECAP: ALWAYS TRY TO PROMOTE THE MOVEMENTS STARTING FROM THE LOWEST FUNCTIONING PART OF THE BODY, SUPPORTED BY THE UPPER BODY AND OUTRIGGERS ONLY AS NEEDED.

Equipment:

Stand-up Outriggers:

It is important to set up the outriggers to create an environment that sets skiers up for success and complements the positions that are recommended.

Most outrigger manufacturers will have full explanation on how to properly assemble their outriggers kit. However, three main adjustments remain essential:
1- distance from handle to cuff (A); 2- distance from handle to the ski (B); 3- heel screw adjustment (C)

1- Distance from handle to cuff remains the same as explained in the outriggers section (A)

2- Distance from the handle to the ski (B)

While standing in an upright position, the 4 Track skier is able to brush the snow surface with the outrigger skis by his/her side. If the 4 Track skier is showing balance problems and needs more support coming from the outriggers by setting them longer, you may enable the skier to maintain a more centered stance according to his/her mobility levels.

3- Heel screw adjustment (C)

Set the screw as the skier in a balance position will barely feel the friction while skiing. Make sure you have the appropriate tool to adjust (unscrew or screw) as it will change often. Take off the heel screw as the skier gains confidence (screw in) or increase it if the skier needs more speed control at the beginning (unscrew).

Teaching Aids

Edgy Wedgie:

An Edgy Wedgie is a device that enables individuals to keep the tips of their skis joined together. It is cheap and consists of two plastic grips that are joined to one another by a piece of rubber and that are fastened to the tips of skis (on the inside of each ski). They are mainly designed for children learning to ski and work best for our adaptive skiers of this age group. Because of their design, edgy wedgies are not effective for teaching adults, as they do not have the strength or durability to cope with the extra pressures created by larger individuals. For an adult that requires support in keeping his/her ski tips close together, consider using a ski tips connector (described below).

Ski-Tip Connector Bra: NOTE – the "ski-monkey" is a new piece of equipment which is stronger than an edgie wedgie with firm clamps onto the ski tips, and webbing as the connector.

A ski tip connector is a more durable and stronger device than an edgy wedgie. It is made of metal and claps to ski tips, which makes it effective for an individual that requires it in keeping their ski tips closer together. Due to its design and heavier construction, it makes it tougher for

children to use. If a device is needed to enable a child to keep his/her ski tips together, then consider using an edgy wedgie.

Heel Spacer:

A heel spacer is a piece of equipment that is placed between the heels of an individual's ski boots enabling the individual to keep the back of his/her skis apart. It can come in different sizes depending on how far apart the skier's stance requires. When combined with an edgy wedgie or ski-tip connector, it can assist an individual in maintaining a wedge shape.

Lift Procedures:

Magic Carpets:

Outriggers should be down in a ski position while riding the magic carpet; the skier can rest them on each side of the magic carpet for needed assistance with balance while not getting caught. Consider having a folding chair to rest at the top and at the bottom of the hill.

T-Bar and Poma / Button Lifts:

When riding surface lifts, the outriggers should be in a down-ski position to assist as needed with balance. It is advised to keep the use of surface lifts like t-bar and poma / button lifts to a minimum where possible due to the increase of fatigue caused by standing for so long and the pressure caused from traveling uphill.

A beginner might be unable to use it; the capacity will be determined by the mobility, balance and stamina of the skier. Be aware of spacing on a t-bar with two skiers both using outriggers and sharing a lift; there is a danger of the two inside outriggers of each person of getting caught. It is feasible, but make sure that an outrigger user is comfortable using the lift before doubling up with another outrigger user.

Chairlift:

Lift loading procedures are in line with standard lift loading procedures. Ensure that before the skier proceeds to sitting down on the chair, the outriggers are down in a ski position and lifted up in front of the skier as they sit down, to avoid the outrigger getting caught under the chair.

It is recommended to put down the safety bar only once the skis are a few feet off of the snow to allow clearance in the event of a sudden stop of the chairlift.

MOVEMENT SEQUENCE OF A 4 TRACKER GETTING IN THE LIFT

9.4 - Sitski (Monoski, Biski and Quadski)

Overview

The sitski is a device that has a molded seat placed upon a frame, and this frame is attached to a ski or skis. The seat should fit snugly since it acts in a similar manner as the skier's foot in the ski boot. On most sitski equipment, the frame is mounted with a shock absorber and it can be lifted to be loaded on a chair lift. The skier is also equipped with short adjustable outriggers to assist with balance and other maneuvers. There are many sitskis on the market and more are being developed.

From an instructor point of view, the aim of teaching an individual using a sitski is to assess ability/ strength/mobility adequately, to select the proper equipment to allow the individual to reach maximum independence as well as ski performance.

Assessment of motor skills for physical activities such as skiing is one of the most important points to start with. It is the very first step in developing an individualized adaptive ski program / progression and used to determine the individual's capabilities as well as the appropriate teaching technique and the choice of adaptive skiing equipment. It is also used to establish individual autonomy goals and plan the ski lesson and learning progression. The assessment is not and should never be only a static evaluation. Because skiing is a motion sport, assessment should also be achieved in movement.

Here are some of the most common type of disabilities for which a sitski may be used:

- Amputation
- Balance Impairments
- Cerebral Palsy
- Cerebrovascular Accident (CVA/stroke)
- Epilepsy
- Limb Deficiency (strength, endurance, spasm, proprioception, etc.)
- Multiple Sclerosis
- Muscular Dystrophy
- Neuromuscular Diseases
- Paralysis & Paresis (paraplegic and Quadriplegic)
- Poliomyelitis
- Post Polio Syndrome
- Spina Bifida
- Spinal Cord Injury
- Traumatic Brain Injury

The above list is by no means complete and many more possibilities could be added. In addition, there are some individual with progressive or degenerative types of disabilities, including knee injuries.

Assessment of Abilities

Consider every individual as unique since the effects of an injury or disability will vary from one individual to another. A complete and detailed individual analysis is needed to determine which ski technique and which piece of equipment is best suited. To achieve this, we propose the AOT process.

The determining factors of a functional ability are:

1- Level of Injury if spinal cord injury (SCI) or nature of the disability,

2- Balance,

3- Mobility,

4- Physical Strength.

Spinal cord injuries are traumas to the spinal cord that temporarily or permanently disrupt the nervous system control below the lesion. Damage to the spinal cord usually results in motor and sensory impairment. Impairment can be complete or incomplete (partial) paralysis, also known as paresis (weakness). Thirty-one pairs of nerves exit the spinal column at various vertebral levels to innervate specific muscles and body organs. The severity of impairment is dependent upon the vertebral level at which the trauma occurs. The higher up the spinal column that the lesion occurs the more severe the injury, with more paralysis and more dysfunction of the musculature. Spinal cord injuries are generally classified as either paraplegia or quadriplegia. Paraplegia is partial or complete paralysis of the legs and lower trunk of the upper body. Quadriplegia is partial or complete paralysis of both arms and both legs. Spinal Cord Injuries that originate from an accident are called Traumatic Spinal Cord Injuries (TSCI).

Spinal Cord Injuries could also originate from other damages (infection, loss of blood supply, compression by a cancer or through slow degeneration of the spinal bones (vertebrae) such as in osteoarthritis, that permanently decrease the flow of information of the neural canal in the spinal cord). Another disability affecting the spinal cord is Spina bifida and is described by a congenital orthopedic defect caused by the failure of one or more vertebral arches to close prior to birth. Spinal Cord Injuries that does not originate from an accident are called Non-Traumatic Spinal Cord Injuries (NTSCI).

Understanding spinal cord injuries can be based on:

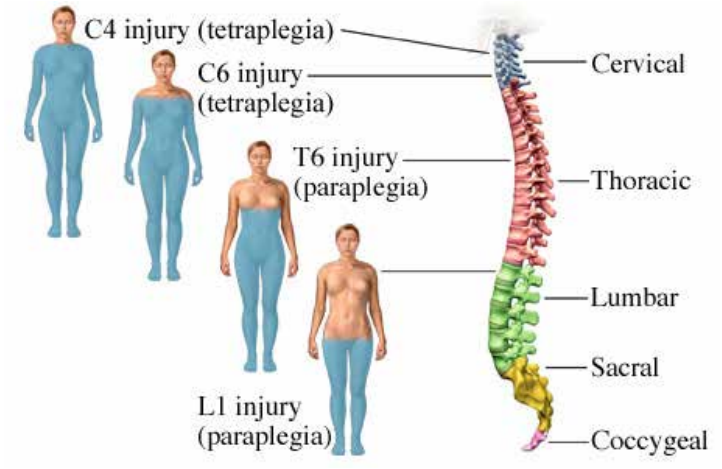
1. Level of injury,
2. Complete or incomplete, as detailed below.

1- Level of injury

The level of injury will tell you which muscles, muscle group or section of the body has been affected by the TSCI or NTSCI, but most of all, it indicates which muscles or muscle group are still functioning.

In the picture below, the blue-colored portions of the body indicate motor and sensory functions that should not be functioning if the TSCI is complete at the indicated level. Normally, an individual will describe the injury by starting with the first letter of the spinal section name.

A SCI is named by the last vertebra from where motor and sensory functions are intact. So when a skier says he is a T6, it would mean that above that level, all motor and sensory functions are intact, thus functional. It also indicates that below that level, all muscles, including abdominals and back muscles, are not functioning and will therefore be affecting the ability to maintain balance, fore and aft as well as lateral movement.



2 - Complete and Incomplete:

When the TSCI of a person begins and ends at the same level on the spinal canal, it is called a '**complete** TSCI'. Inversely, when a TSCI starts and ends at a different level on the spinal canal, it is called an **incomplete** TSCI or **incomplete** NTSCI. That information is very important for the ski instructor assessment. Let's use the same example as above: the third person (T6) in the above picture. The person now tells you that the SCI is incomplete and ends at L1 level. Now you understand that above T6 all motor and sensory functions are normal. But the incomplete information tells you that, between T6 and L1, there will be motor or sensory functions (or both) that remains functional. Therefore, this might increase the number of working muscles and the ability of the individual to use more muscles.

Each instructor must have gone through the Student Medical Sheet (Appendix 6) prior to performing AOT.

Ask

Ask	Look for
What level of injury do the individual have?	Part of the body that is not affected by the injury. Identify functioning part of the body.
Is it complete or incomplete?	Sensory and motor activity functioning below the SCI.
What is the level of functioning in those limbs? If you do not have specific tools to measure the range of motion, use the unaffected side as an example to compare.	For the upper limbs : hand grip, ability to flex and extend fingers, wrists flex, extend, and rotate, forearm flexion, extension and rotation (inside and outside) and the bicep and triceps flexion and extension. You can do the same assessment for the torso and for the legs.
If NTSCI, what is the disability?	Level of functioning.
What other sports does the individual participate in?	Sports that require balance, strength, and mobility.
Do they think of themselves as fit and active? If so, why?	The ability to correctly self-evaluate.
Have they used any other specialized adaptive sports equipment?	Sports that could be related to skiing as well as adapted equipment.
Have they skied before?	Previous ski level, type of skier, etc.
Where do they think their strengths are?	Perseverance, participation in other sports, positive attitudes, self-determination, etc.
How did the skier overcome challenges?	Creative answers, perseverance, self-determination, etc.

Observe

Observe	Look for	Relate to skiing
If using a wheelchair, how does the individual manage to get to you (opening doors, going around obstacles, etc.)?	Ability to opens doors, going over little steps, individual is using full upper body strength or requires support.	The ease with which the individual uses the chair could indicate good control over body movements. This would result in the individual ability to find balance in a sitski faster than an individual that struggles with basic movements.
Is the individual is able to reach down on the side with one hand.	Ability to perform the task without supporting himself onto the wheel.	Having to hold onto the opposing side of the wheel chair while leaning the other way indicates a possible loss or weakness of back & abdominal muscles control, resulting in difficulties with lateral balance.
Does the individual transfer from the wheelchair to a seat?	Ability of the individual to perform the transfer. Fluidity of the transfer	Fluid, quick transfers indicate that an individual has good strength and coordination relative to mobility levels. We would expect an individual who can perform quick and smooth transfers, to quickly find balance.

Test

Remember that during the upcoming tests, some exercises will be easy to perform while others difficult if not impossible. The result of these tests will help you to better understand how to adapt the teaching.

Balance:

Balance assessment of an individual using a sitski is an important assessment. Balance can be tested by using seven basic maneuvers in the wheelchair or directly into sitski. Each task is scored on a 4-point scale with 3 representing complete independence/autonomy and 0 (zero) representing total need of assistance. Use the balance test table below to help you assess this skill.

Balance Test	Using wheelchair Score 0 to 3	Using sitski Score 0 to 3
1- From a straight forward position, reach down at your left and return.		
2- From a straight forward position, reach down at your right and return.		
3- From a straight forward position, reach down to your feet and return.		
4- From a straight forward position, rotate both torso and shoulder to the left and return. (maintain balance)		
5- From a straight forward position, rotate both torso and shoulder to the right and to the left and return (maintain balance)		
6- From a straight position, reach forward at 45 degrees to your right and then return to center.		

(0= Unable to reach the position and or unable to get back up w/o assistance; 1= Able but need help and shows instability; 2= Able but needs help to initiate the movement going back up, shows no instability; 3= Able without any help).

Use this as a guideline for equipment choice for the student: If balance score is lower or equal to 7, a bi-ski with rigid shoulder straps should be strongly considered; a Quadski is also an option if arms strength is weak. If score is between 8 and 14, an abdominal elastic strap is to be strongly considered and at this point, a bi-ski or monoski can be used. If the total score is 16 or higher, the individual does not present a balance issue and would use a monoski or an advanced bi-ski.

Mobility

This mobility test shows how the individual is able to support and move around with his own weight. A low score would mean that an individual with SCI will require assistance when getting onto the chair lift and getting up after a fall.

Mobility Test	Score 0 to 3
1- Perform a horizontal transfer from a chair to another chair side-by-side.	
2- Perform a vertical transfer from one chair to another placed at 90 degrees to the individual's left side.	
3- Perform a vertical transfer from one chair to another placed at 90 degrees to the individual's right side.	
4- Ask the individual to lift up and support the body weight for a minimum of 15 seconds.	

For test 2, 3 and 4, the individual may try up to 3 times, use only the best score.

(0= absolutely needs assistance; 1= Needs some assistance but with time, is able to perform the action; 2= Needs little assistance; 3= Independent)

If the mobility score is lower or equal to 5, a bi-ski might be a good equipment to use for stability. Some bi-skis also include a push-up device to help the individual get onto the chairlift. A score between 5 and 9 would suggest that a bi-ski or an advanced bi-ski should be used, and a score higher than 9 would suggest consideration for a monoski or an advanced bi-ski.

Physical Strength:

Physical strength is a challenge. In fact, shoulders, arms, wrists, and hand grip will be used at all time. Moreover, torso muscles (back and abs), when functional, will be needed for lateral and fore and aft balance. A higher score will lead you to select a monoski or a more advanced bi-ski while a lower score will suggest the use of a bi-ski.

Physical Strength Test (in the sitski)	Score 0 to 3
Lift rear of the sitski using the two outriggers in a crutch position for a maximum of 15 seconds.	
Using the outriggers, perform a 360-degree. Every step of the turn is to be lifted (goal) but could be slide.	
From a fall on the snow, get back up (teach and demo every maneuver and steps required to perform the task prior to test).	
Push forward 50ft / 15 meters.	
Push backward 50ft / 15 meters.	
On a beginner hill, push uphill in a forward position for 25ft / 7 meters.	
On a beginner hill, push uphill in a backward position for 25ft / 7meters.	

(0= absolutely needs assistance; 1= Needs some assistance but with time is able to perform it; 2= Needs little assistance; 3= Independent)

After completing tests, ask the skier to evaluate the fatigue level he may feel using the Fatigue Chart (Appendix 10). Rapid reports of fatigue will directly impact on the relation between resting periods and reliance on skiing aids for support.

Table 1: Decision-making Table for assessing the individual Abilities

Injury level / disability	Complete - Incomplete	Balance	Mobility	Physical Strength	Suitable Sitski (Mono-Bi) Quad.

Equipment

In many adaptive ski programs, choosing the proper equipment is not a question, mainly because that particular ski program only has one sitski. Therefore, without a choice of equipment, the only decision to take is the teaching techniques to use. The scoring system for balance, mobility, and strength can also be used to carry out an equipment assessment for your future sitski purchases. For example, if you carry out a balance, mobility and strength tests for your sitski program and most individual scores high on the tests, you may then look to buy equipment that matches the results.

Usually, if the individual test results shows:

1- An injury level that is above T6 (whether its origin is from TSCI or NTSCI) and test results are:

1.2- below 7/18 on the balance;

1.3- below 6/12 on the mobility;

1.4- below 6/21 on the strength.

The ski instructor will choose adapted equipment that:

A) Has a seat closer to the ground;

B) Has multiple strapping possibilities (shoulder belt and abdominal/thoracic elastic band);

C) Could be operated directly from the back, using thumbing or bucketing technique, or holding a back bar, or tethered;

D) Has the possibility to add fixed outriggers to increase stability.

Attention: Putting an individual with more functional muscles groups into equipment that usually fits the need of individual with less functional muscles groups will result in a possible decrease of the autonomy level of the person and increase the possibility of damaging the equipment. Inversely, putting an individual with less functional abilities into an equipment that require more abilities from the individual will result in increasing balance problem, increasing risk of injuries and increasing stress. There are no real solutions as for equipment, and the guideline remains: choose the equipment that best fit the skills assessment. Should the adapted ski program does not have the equipment needed, tell your skier about it, and make your teaching as adaptive as you possibly can.

The general guideline is that if scores from balance, mobility and strength tests are low, select equipment that is close to the ground with a wider base (bi-ski or quadski). Below is a quick description of the actual continuum of existing adapted equipment. Different types of equipment could be found on the market for each section of the continuum. The pictures shown below are for examples only and must not be taken as a commercial publicity. Some equipment requires specific training / certification from the manufacturer. Therefore the training is not included in the CADS Instructor Manual.

Each category of the continuum is headed, has one or more pictures for example and a description of who might use it. Finally, a table is presented and refers to the above test section. Apply your test results into the table to see what equipment category would best serve your student. Each Table presents a Yellow zone that guides you. If you decide to use specific equipment, the tests results score should normally fit into the Yellow zone. If not, it might not be the best equipment for your student.

Equipment Continuum

Little or no balance — **Good balance**

Little or no mobility — **High mobility**

Little or no strength — **Good strength**

Category: ski sled with driver directly from the back

The individual is unable to maintain balance, has very little to no upper-body mobility nor strength. Possible hypertonia or spastic/rigid muscles; difficulty to fit properly into any sitski. Unable to get onto the ski lift or get up after a fall. Needs complete assistance. Move around using an electric or motorized wheelchair. The equipment will not help the individual to reach autonomy but is likely to be included in an integration of community winter activity / sports.

Equipment that requires additional training and certification from manufacturer.

Balance								
0				9				18
Mobility								
0				6				12
Strength								
0				10.5				21

Category: Quadski being tethered and/or bi-ski with ski instructor holding the back bar seat.

Balance is a serious issue, average or weak to little body mobility and strength. Unable to generate and control proper hand grip to use the outriggers. Needs assistance and tethering at all times for balance and speed control, as well as the quadski adaptor (fixed outriggers) to widen base as necessary. Unable to get onto the ski lift or to get up after a fall without assistance.

Balance								
0				9				18
Mobility								
0				6				12
Strength								
0				10.5				21

Category: Bi-ski / Quadski with driver directly from the back holding seat or a back bar or tethering. Tethered at all times, kartski

Balance is still an important issue, low mobility in general and strength capacity increase as muscle groups that are closer to the body (shoulder, biceps and triceps) are used. Individual has little grip capability.

Needs assistance at all times for speed control. Unable to neither get onto the ski lift nor get up after a fall without assistance. Moves around using an electric, motorized, or manual wheelchair.

Balance								
0				9				18
Mobility								
0				6				12
Strength								
0				10.5				21

Category: Bi-ski with or without tether

Balance is weak to average, little to no abdominal and back muscles, good to firm hand grip, strong enough to use the outriggers but unable to lift the sitski while sitting in it. Needs the assistance of a tethering at all times to prevent speeding, and getting up after a fall. No need for fixed outriggers. Low to high difficulty to get onto the ski lift without assistance.

Balance								
0				9				18
Mobility								
0				6				12
Strength								
0				10.5				21

Category: Bi-ski, advanced bi-ski and monoski

Balance is still lacking but mobility and strength are not. Individual may use additional abdominal/thoracic elastic strap/belt depending on the SCI level or disability, and the dynamic balance test results. No need of any help for loading onto the ski lift or for getting back up after a fall.

Balance								
0				9				18
Mobility								
0				6				12
Strength								
0				10.5				21

Category: advanced bi-ski or monoski

Balance, mobility and strength present high score while performing tests. Individual can be tethered at first (speed control only). As the individual gains balance and speed control, tethering becomes unnecessary. The learning curve is quick and will only be limited by the individual's attitude. No need for assistance anywhere but someone to ski with.

Balance								
0				9				18
Mobility								
0				6				12
Strength								
0				10.5				21

Seat:

The seat of a sitski plays the role of a ski boot. Therefore, the individual should fit snugly into the seat. In fact, the more the seat is adapted for the skier, the more balance and control of the sitski the individual has.

Some seats are standard and some are thermoformed. The thermoformed seat is likely be used when the individual has scoliosis, needs additional back support, has back pain problem.

Thermoformed inner seat in the making.

Front cut of a thermoformed inner seat showing different legs sizes.

Check if there are spaces between the individual body and the inner seat foam. If so, fill the space or change seat size, or inner foam thickness. When the individual is properly fitted into the seat, re-test balance. Some manufacturers will propose various seat sizes with their sitski unit, others propose extendable seats (one size fits all) and finally, some do not offer any choices.

Most sitskis have rigid shoulder straps and/or abdominal/thoracic elastic band that can increase upper body stability. These are used depending on the SCI and NTSCI level. For a skier with a low SCI level, the freedom to move back and forth in the sitski seat will enhance the ski experience. For a skier with a high SCI (T6 and above) level, the elastic chess band will give the individual greater control, balance and increase safety. Generally, the straps or elastic bands are flexible or elastic, come in different sizes (4, 6 and 8 inches wide), and are attached by Velcro.

Manufacturers may suggest specific adaptations for positioning, but this manual is intended to guide you through the steps of strapping most belts, elastic band and straps before skiing. Individual may use their own personal inner seat to decrease the risk of pressure sores. When an individual is using his own inner seat, the instructor needs to ensure that the material used in the inner seat does NOT become harder in cold weather.

Sitski Strapping Steps:

Before performing the strapping steps, ask the individual to empty pockets.

Step 1 – Waist / hip strap: After the individual has been transferred (with or without assistance) into the sitski seat, make sure that individual's buttocks are properly positioned (as far back as possible in the seat); pull firmly the waist belt/strap. Buckle should be centered with the skier's body. If the individual has some sensory information originating from the waist, then ask if the belt is hurting or decreasing the torso flexibility.

Step 2 - Thigh strap: Raise knee level in order to decrease back leg pressure. Instructor should be able to slide your fingers easily between the back leg muscles and the seat foam cover. Ensure that when strapping the thigh belt, you do not squeeze the catheter, as this could decrease or stop the urine flow, and increase the possibility of infection. Both knees should be equally leveled. Unleveled knees indicate that the skier may be twisted in the seat at the waist level. If knees are unleveled, undo both thigh and waist straps, reposition the body, and redo steps 1 and 2.

Step 3 - Foot strap: When the above two steps are completed, adjust the foot support for the longest leg when that equipment option is available, and add padding underneath the other foot (as needed). Then, strap both feet. That strap should not be tightened too firmly since it might decrease blood flow and increasing chances of freezing.

Step 4 - Chest band and or shoulders straps: To be used as required. Normally, the balance skill test done before will guide you whether or not these should be used. On one hand, the elastic chest belt gives the individual more stability, range of motion laterally, and fore and aft. If the

individual is able to control balance using the elastic band, it is then suggested to use it. On the other hand, shoulder straps are rigid and will not permit any movement as their role is to get the individual's torso as close as possible to back seat for stability and safety. Do the balance test again and see if the individual gets better results from being strapped at the chest level. DO NOT USE them if not necessary, as this could impede the progression of the skier.

Setting up the outriggers:

Outrigger Set Up:

Most outrigger manufacturers provide full explanation on how to properly assemble their outrigger kit. However, three main adjustments remain essential: 1- Distance from handle to cuff (A); 2- Distance from handle to the ski (B); 3- Ski Heel screw adjustment (C)

In sitskiing, "A" remains the same as explained in the Outrigger adjustment section above. For the length «B», you need to make sure that they are set at a length that facilitates a centered mobile stance. To achieve this, the individual has to have an athletic upper-body position, with outriggers on the snow in a ski setting position, shoulder width, arms close to the torso and slightly flexed at elbow joint. Outriggers should be placed between the thighs and feet. That way, the center of mass (COM) is directly over the base of support (BOS).

Another way to set the length B of the outriggers is to use the outriggers in a walk-setting position, aligned on each side of the torso and shoulder width, ready to push up. Shoulders and elbows should be horizontal; elbows must never be higher than the shoulders, but equal or lower.

Finally, the ski heel screw adjustment (C) would have to be screwed/unscrewed in order to increase heel pressure on the snow surface immediately when needed (i.e. if the individual pushes down using forearm). This adjustment is to be revised, meaning that the instructor will add or decrease the screw adjustment as needed (depending on individual attitude, SCI and NTSCI level, proper sitski equipment used, etc.).

Dowel Testing

The dowel test is used to determine where the sitski base should be placed with reference to the skier center of mass (between ski/skis bindings). Proper placement allows the individual to make full use of the sitski and be set up for optimum on-snow performance.
All adjustments for proper seating (padding, frame length, torso support and outriggers) need to be done prior to performing the dowel test. This test is done with the individual sitting in the sitski, maintaining good balance and a centered position.

A wooden rod of 4 centimeters (cm) in diameter or an equilateral triangle with a length of 60 cm should work well for the dowel test. Follow this 6 step instruction to perform a dowel test:

Determine the center of the ski, which is the manufacturer's designated center of the ski, from where the ski performs at its best. (Most skis have a center mark).

The individual should be dressed in full ski clothes and helmet then transfer to the sitski.

1. Have the individual use the outriggers for support.
2. Place the dowel under the sitski ski/skis, perpendicular to the sitski and at the ski center.
3. Have the individual take an athletic position; then, position the individual balanced on the dowel. The individual should be able to tip fore and aft with minimal movement of the head/shoulder, while maintaining a functional sitskiing stance. If the individual cannot balance, move the dowel slightly forward or back as necessary until the balance point is achieved.
4. The point at which the individual reaches balance, directly above the dowel, is approximately the center of the ski. Mark this point on the base frame of the sitski where it interfaces with the ski.
5. Move the ski to align the mark of the sitski base frame over the ski center mark. This is a reasonably good place to start with a beginner skier to take best advantage of the ski's technical design.
6. If not properly balanced, the sitski might skid out at the end of the turn if mounted too far forward or unable to initiate if mounted too far back.

After choosing the equipment, a full check of the features which include: straps, buckles, seat and ski attachment, carabineer, belts, tether, ski lift attachments (safety line, evacuation harness), loading and locking system, must be done. Moreover, every nuts & bolts should be checked as well. Straps, elastic bands, tether must not present with knots, and the integrity of the straps MUST be free of tears or rips, as well as no cracks in the buckles, seat and carabineer.

ANYTHING that seems damaged or missing must bring this question to the instructor's mind: "If I use this equipment, am I jeopardizing the individual's safety?" Unless the answer is NO, do not use the equipment and take necessary actions to get it fixed and ready, following the manufacturer's guidelines.

Sitski Check List		
Description	**OK**	**Fix/repair**
Rigid back straps + buckles,		
Elastic abdominal / thoracic ban		
Rigid hips straps + buckles		
Rigid thigh straps + buckles		
Tether		
Rigid foot straps + buckles		
Rigid outside handles straps		
Attachment integrity between seat and frame		
Carabineer		
Lock and unlock Mechanism for chairlift + pin		
Lock and unlock Mechanism for ski position + pin		
Alignment integrity of the sitski: Back Seat, thigh, foot and skis MUST be aligned.		
Integrity of all pivot mechanism available on the equipment. Check if they all have their nuts, washer, screw.		
Integrity of the binding system		
Skis are tuned		

Teaching Techniques

Individual often progress quickly when using appropriate ski techniques and proper fitting. Progression is dependent on each skier's balance, mobility and strength within their own SCI level or disability.

The teaching techniques presented in this manual aim at helping the ski instructor to guide a beginner skier to progress up to complete autonomy.

The following are 6 different steps to follow as a recommended progression.

Step 1: Introduction to equipment

Goals

- **Develop familiarity with the equipment**

After having set and adjusted the sitski and the outriggers, the skier may already have difficulties maintaining a centered, mobile stance. Here is a brief list of possible problems.

Assessment / Observation	Possible Origin / Reason	Development - Solutions
Un leveled knees	One leg longer, twisted buttock in the seat,	Adjust foot plate for the longest leg and add foam under the shorter foot.
Re-assess seat fitting and positioning		
Twisted in the seat	Scoliosis, twisted buttock in the seat, buttock muscles are bigger on one side, wallet in rear pocket,	Re-assess seat fitting and positioning
Leaning shoulder and upper body on one side	Scoliosis,	Redo the positioning respecting body alignment
Arm flexions are not the same while outriggers are on the snow	Outriggers aren't the same length	Re-assess outriggers adjustment
Unable to maintain balance.	Lack of stability of the core and torso, equipment alignment is compromised	Re-assess AOT and the choice of equipment, seat fitting and positioning.

Step 2: Basic mobility (on Snow)

Goals

- **Develop mobility**
- **Develop skills - balance**
- **Introducing pivoting**

Description	Stance & Balance	Pivoting	Edging
On Flat terrain			
Lift up and lowering the outriggers one at a time and both at the same time to insure the sense of balance necessary to stay upright in the sitski.	X		
Rotate the sitski using the outriggers in crutch position.	X	X	
Moving on Flat terrain (outrigger in crutch and ski position)			
Using the outriggers in either ski position or in crutch position, the individual should propel forward and backwards.	X		
With the outriggers (ski position) ahead and pointed inward toward ski, apply pressure to the edge of the outrigger and push backwards.	X		
With the outrigger (ski position) behind and pointing outwards, push against the edge of the outrigger ski and move forward.	X		
If possible, move backwards up a small incline, ending on a flat surface (try both the outriggers set in a crutch and ski position).	X		
Lift one outrigger off the ground and maintain balance, repeat with the other side.	X		
Lift one outrigger off the ground (seat and shoulder level) and maintain balance, repeat with the other side.	X		
Lift both outriggers off the ground (seat and shoulder level) and rotate the upper body to the left and to the right and maintain balance.	X		

✔ **Note to the instructor:** Try to promote skier movement to be as smooth as possible.

Assessment / Observation	Possible Origin / Reason	Development / Solutions
While the individual perform the basic mobility exercises, you observe: Core instability. Lack of balance, Lack of mobility, Lack of strength. Knees are not leveled equally	Not seated correctly, Different Strength (left/right), Individual is not strapped properly,	Reposition the body into the seat. Strap a bit more firmly. Re-assess AOT – Balance and strength
	There might be spaces between individual's body and seat	Reposition the individual into the seat. Re-check the fitting Add foam as required, change seat size if equipment permits.
	Person is seated unbalanced Scoliosis,	Being balanced does not mean that the person has to be straight-up because it might not be the usual body position and therefore the person may be forced to compensate. Therefore, it might end in a decrease of balance ability. Position the individual with respect of the natural body alignment. Re-check strapping requirements to add support to assist balancing.
	Longer leg, Twisted in the seat	Adjust foot support to the longest leg and add padding under the shortest one. Reposition the individual into the seat
	You do not see anything wrong.	Check that the strapping is appropriate for the individual. Check if the sitski choice corresponds to the individual's ability. You may have to reconsider re-doing your Balance, mobility and Strength assessment test.

Step 3: Gliding and Stopping

Goals

- **Develop Balance skills while straight sliding**
- **Ability to (slow down) stop using outriggers**
- **Ability to control speed through use of outriggers**

Starting on a beginner slope, outriggers in a ski position. Place the outriggers on the snow, ahead of the skier with tips pointing inward (on their edges). Release edges to slide down the slope.

Description slight incline or beginner hill	Stance & Balance	Pivoting	Edging
Slide straight forward in a relaxed and balanced position with outriggers pointing towards the direction of travel. Use terrain to stop.	X		
Slide forward and engage outriggers heel to slowdown to a stop.	X		
Slide forward and perform a heeling stop (add and decrease screw adjustment to feel difference),	X		
Lift both outriggers during straight forward slide.	X		
Slide forward and perform slight brake/friction on the snow using outriggers heel to slow down and keep going straight.	X		

Assessment / Observation	Possible Origin / Reason	Development - Solutions
Quickly out of balance or turn always on the same side	The skier pushes equally on the outriggers but the setting C (screw adjustment) is not the same on each side. Therefore, the braking is unequal.	Reset the screw adjustment C as well as the outriggers length B equally on each side.
	The skier has a dominant/ stronger side which they prefer to lean towards.	Have the skier trust in their weaker side to remain centered over the ski.
Shoulders are being pushed back, arms are shaking or unstable.	The adjustment screw C on the outriggers is too long causing too much resistance between the outriggers and the snow.	Shorten the screws.
Cannot maintain balance. Exhibits difficulty when lifting one outrigger or both.	The individual's chest / torso is unable to compensate the lifting, thus making the seat and the sitski to lean on the same side of the lifting.	You may have overestimated the individual core / torso strength. The use of thoracic band may help fix the problem.

Step 4: Individual turns

Goals

- **Single left turn;**
- **Single right turn;**
- **Develop pivoting and edging skills;**
- **Continue to develop balance skills;**
- **Introduction to link turns;**

STEPS to perform a single turn

Using beginner terrain, ideally with a flat run out, have the student perform a straight run down the fall line, keeping the ski(s) flat. Once balanced and with momentum, have them start to turn by pivoting the ski(s) using steering effort of the upper body which is led from the lowest functioning body part in connection with the seat. If the student has feeling in their hips and buttocks, have them use these body parts to steer. If the individual has a SCI then have them start to steer from the body part where their injury is located or the lowest body part where they use their muscles.

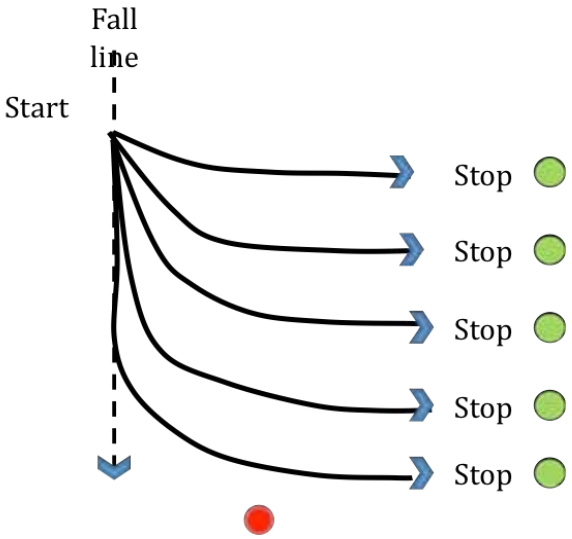
Encourage the student to keep steering across the fall line in the direction of the turn until they come a stop. Have them repeat this action a few times until achieving success, making sure they try it on both the left and right sides.

Methodology to support success:

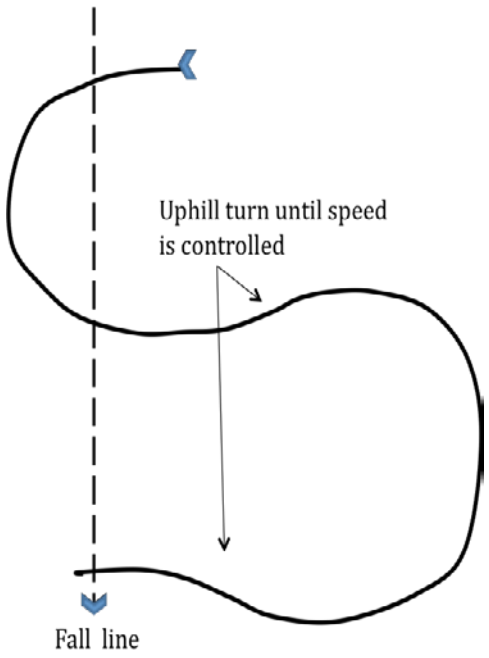
The goal for the student is to finish in a good position, ready to start their next turn.

This is achieved by having the student keep their head facing slightly downhill throughout the turn. This will assist the lowest functional body part to perform the steering effort, creating separation relative to the student's mobility levels. It will also help maintain control over steering by helping prevent them from over-rotating and finishing facing uphill.

Repeat in both directions

Description	Stance & Balance	Pivoting	Edging
If necessary using the appropriate terrain, have the skier perform the Fan-progression exercise. Repeat in both directions.			
	X	X	X

Have the skier perform a complete turn and control speed by continuing to steer the sitski uphill. As momentum begins to decrease, have the skier turn the sitski in the opposite direction thereby linking two turns. Rhythm and confidence will increase as the skier controls speed between turn.

Description	Stance & Balance	Pivoting	Edging
If the Fan progression is used and completed, have the skier perform a complete turn and control speed by continuing to steer the sitski uphill. As momentum begins to decrease, have the skier turn the sitski in the opposite direction thereby linking two turns. Rhythm and confidence will increase as the skier controls speed between turn.	X	X	X
	X	X	X

Assessment / Observation	Possible Origin / Reason	Development - Solutions
Balance over the edge is difficult to maintain.	Unstable, the skier often falls on the uphill side. The skier is leaning uphill. The skier may be placing the uphill outriggers too far away from the sitski.	Check all straps, body position, and re-check balance ability on the flat. May have to tighten or loosen the thoracic belt. Practice maintaining a centered balanced position and be sure both outriggers stay on the snow at all times. Keep outriggers close to the body, elbows tucked in to support chest, and keep the individual more centered.
Ability to perform side-slipping on one side, or having difficulty on the other side. The skier falls on the uphill or downhill side.	Sitski frame is twisted. Knees are not leveled. Skier is stronger on one side of their body and favors this side. Scoliosis. Undetected/ hidden back problems and back pain	Check the sitski alignment: individual's shoulders - seat – knees, and skis. Crooked body position in the seat, reposition the individual. Have the skier trust the weaker side and try to maintain more centered position. Try more pressure on the outrigger on the weaker side. The skier may have a scoliosis to deal with; adjust the sitting and compensate… lift or lower buttock on one side, and do the opposite on the other side. Re-asses the AOT.

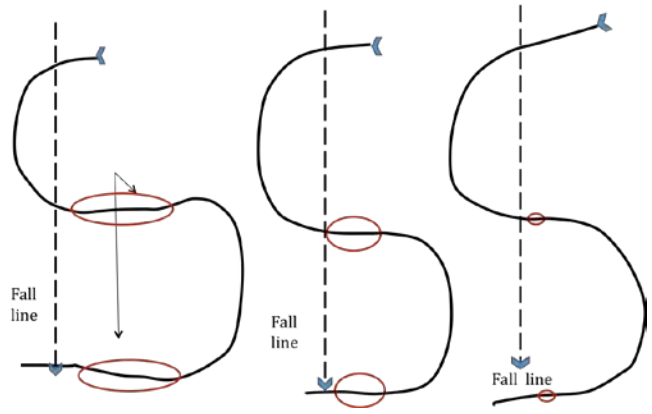
Step 5: Linking Turns

Goals

- **Introduce skier to multiple linked turns**
- **Control speed using turn-shape**

When possible, bring the skier to convex terrain to feel the action of pivoting the ski.

Description	Stance & Balance	Pivoting	Edging
Continue to link turns on a green groomed slope until the student has gained confidence in controlling speed. At this point encourage maximum speed/ minimum slope as this will result in linking fewer turns but at increased speed.	X	X	X
As confidence increases, move to blue groomed terrain to link turns. Use of single turn may again be required to develop confidence, progressing to a Garland exercise. Continue with turn linking, turn shape and speed control. Use guided mileage for further improvement. Eventually move to more challenging terrain. As with all terrain progressions, make sure the next challenge or terrain choice is safely achievable. Introduce the Hockey stop.	X	X	X



The goal is to link turn and eliminating the traverse (Diag. 1) between turns (Diag. 2 & 3)

The transition between turns will decrease so that the sequence becomes turn to turn without any traverse. Speed will increase but be controlled.

Step 6: Turn progression and beyond

Goals:

- **Continue to develop the Technical Reference**
- **Experiment with changing the turn-radius and speed (short and long turns)**
- **Experiment and build confidence with different speeds, terrain and snow conditions**

As linking of turns becomes more confident and speed is increased but controlled, the objective is to improve and refine skills. Choose tactics to enhance the Technical reference and continue to experiment with turn shape and speed for improvement through guided mileage.

MOVEMENT SEQUENCE

Below is a table of tactics performance outcomes that relate to skiers at this level.

Intermediate Sitskier	Stance & Balance	Pivoting	Edging	Pressure Control	Timing & Coordination
Lifting outriggers at the beginning of every turn.	X				
Side-slipping on both sides.	X		X	X	
Hockey stops	X	X	X	X	X
Full turn	X	X	X	X	X
Short radius turns (one cat track wide)	X	X	X	X	X
Long radius turns (two cat track wide)	X	X	X	X	X
Counting through turns (1,2,3) 1 = at the start of their turn, 2 = at the fall line, 3 = through completion.					X
Skiing faster on green runs (minimum slope/ maximum speed)	X	X	X	X	X
Skiing around glade skiing	X	X	X	X	X
Skiing variable terrain : powder, moguls, etc.	X	X	X	X	X

Tethering

Backgound & Objective

Generally, we train intermediate and advanced adaptive skiers to become tetherers. The skiing drills presented below are designed to improve the instructor's skiing ability as well as their understanding of tethering requirements.

These drills will improve edging skills in turns and sideslips. Improvements in timing and co-ordination required to transition from a snowplow/wedge turn to sideslip to parallel will result. Emphasis is to ski in the fall line, which is a "must" for safe tethering.

Based on the instructor developing the require skill through use of the drill, further specific tether training using sitski and stand up skier will be required.

1. Snowplow/wedge Drill

- On a beginner to intermediate slope ski in a straight line down the fall line, and demonstrate the difference between a slightly edged snowplow (narrow ski placement) and an a power plow (wide ski placement).
- Have the instructor perform a snowplow/wedge drill from a narrow stance snowplow to a strongly edge snowplow that stop completely:
- Continue this exercise several times down the slope.

2. Pedal Turns Drill

- On gentle groomed intermediate slope, ski straight down the fall line in a snowplow position.
- Increase the pressure on the inside edge of the ski to initiate a turn. As the turn initiates, release the outside edge and pressure the inside edge of the left ski to initiate the turn in the other direction.
- Repeat using quick initiated turns, the skier should remain in the fall line at all times.

3. Skate / Hockey Stop Drill

- On an intermediate to advanced slope, demonstrate a hockey stop in both directions.
- Do this exercise one stop at a time.
- Ensure that the skier' upper torso is facing the direction of travel, arms forward and balance on the skis.
- Ensure that skier stops with skis completely across the hill (perpendicular to the fall line)
- Vary distance and speed.

4. Sideslip Drill

- On an intermediate slope, demonstrate a controlled sideslip using edges to slow down (almost stop), then released edges to slide further.
- Repeat controlled sideslip with skis facing the other direction.
- The skier will need to maintain a centered balance stance to remain in the fall line with no ski movement across the hill during this exercise.

5. Falling Leaf Exercise

- The falling leaf exercise builds on the sideslip drill using an intermediate to advanced slope.
- Initiate a downhill sideslip.(as describe above)
- Using slight edging of the skis, change balance minimally by moving weight to the front of the skis. The skis will move forward and down the slope on edge. As the skid continues forward, move weight from the front of the skis to the tail of the skis which will result in a slide backward to the side of the slope. Have patience in both directions.
- Repeat this process several times using narrow corridor. (one cat track wide)

6. Snowplow Turn Transitioning to a Skidded-Parallel Turn

- On an intermediate slope, demonstrate a snowplow turn that changes at the fall line bringing the skis parallel through turn completion.
- Ensure that the parallel turn is skidded or sliding downhill through the completion of the turn.
- Repeat in the opposite direction.
- Link a series of these turns.
- Finally, skiing straight down the fall line, practice snowplow transitioning to a sideslip in one direction.
- Repeat facing in the opposite direction several times.

7. Synchronized Skiing

- On a beginner slope, demonstrate synchronized skiing using 2 skiers, one behind the other, skiing in a snowplow stance.
- Begin with short radius turns staying in a very narrow skiing corridor.
- Stay very close to the downhill skier.
- Ensure that the uphill skier remains in the downhill skier's fall line.
- The uphill skier should be verbally communicating when to turn.
- Try this exercise using medium radius turns and vary the distance between the 2 skiers.
- Try these same exercises with the downhill skier communicating when to turn.

8. Synchronized Skiing using Bamboo Poles

- In this exercise, the skiers should be synchro-skiing (in a snow-plow stance) in the fall line one behind each other holding bamboo with the same side hand.
- The downhill skier must hold their hands in a rigid position.
- The uphill skier can now initiate turns for the downhill skier using by pulling/pushing on one of the bamboo poles.
- The uphill skier must be verbally communicating the turns to the downhill skier.

9. Synchronized Skiing using Hip / Waist Tethers

Ensure that the instructor / tetherer keeps their elbows tucked in while tethering, to promote stability and a much stronger position. They also need to secure the tether securely to the non-dominant wrist in case of a fall.

- Same as above exercise with poles, only with joined tether straps around downhill skier's hips.
- Ensure that joined tether straps are not wrapped completely around the downhill skier. They should only form a half wrap or half circle around the front of the skier.
- Downhill skier should hold tethers to ensure that they don't slip when uphill skier is initiating the turns.
- Uphill skier, who is verbally communicating turns, should be skiing in the downhill skier's fall line at all times.
- Perform same exercise using short radius snowplow turns with uphill skier skiing in a straight line (versus in downhill skier's fall line) and using upper-body rotation to follow/ tether the downhill skier. Repeat using medium radius turns (downhill skier only) and longer tether straps
- Discuss and compare fall line tethering versus the technique used in the above drill.

10. Synchronized Skiing using Hand-Held Tethers

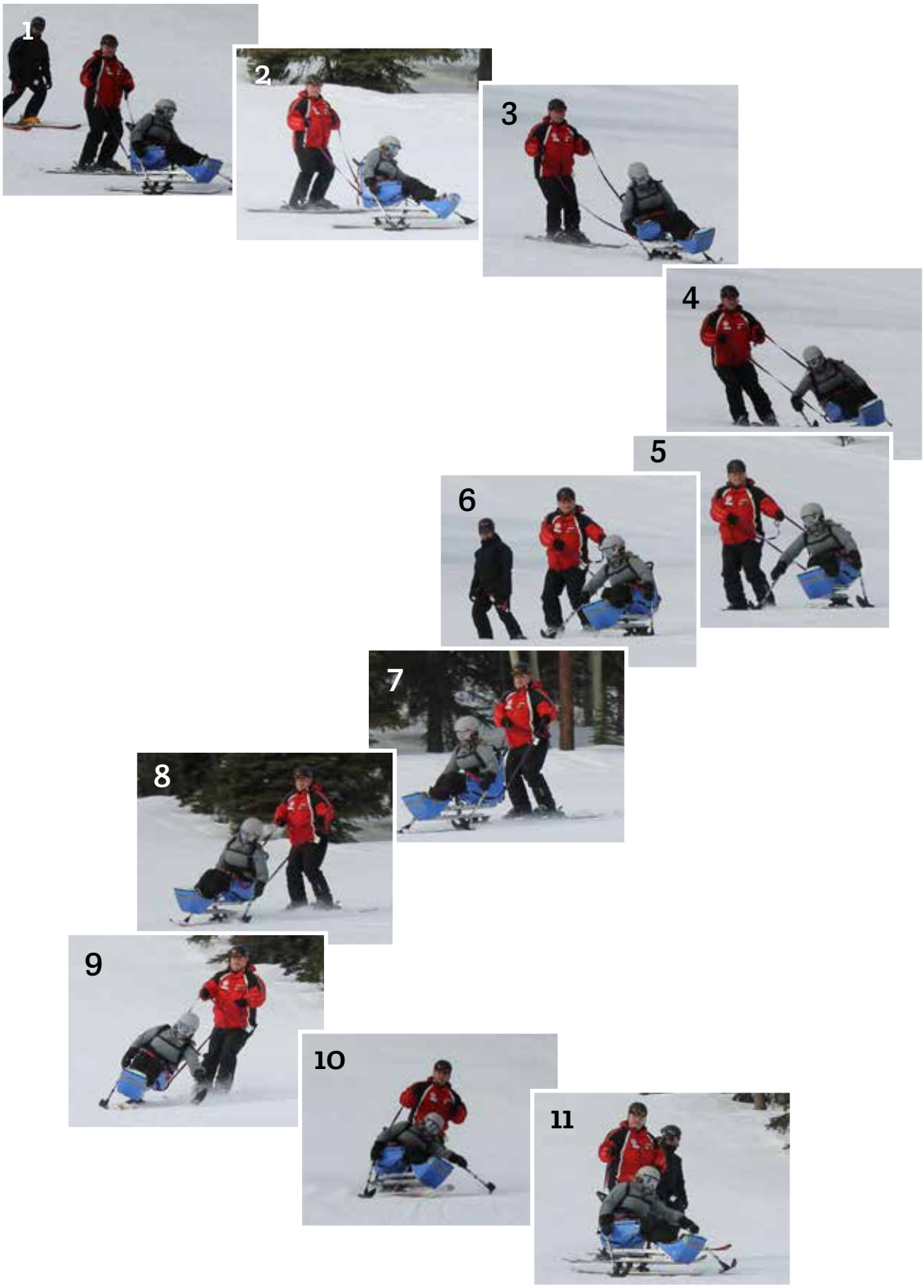
- On a beginner slope, repeat the exercise similar to the above, only in this case, the tethers are held in the skier's hands similar to the bamboo pole exercise.
- The uphill skier will use verbal commands to initiate the turns (*i.e. both skiers are initiating the turns, tethers are not used, but should remain taunt at all times*).
- This exercise can develop to skidded-parallel turns (*snowplow turn transitioning to a skidded-parallel turn*) practiced on an intermediate slope.
- Uphill skier who is verbally communicating turns should be skiing in the downhill skier's fall line at all times.

11. Tethering a weighted sitski and stand up skier.

- Skier practices tethering with a weighted sitski. Once the skier displays confidence and safe technique tethering a weighted sitski, progress to a person loaded sitski on green groomed slopes.
- When traversing with a sitski, controlling speed and direction, any pressure is on the downhill hand to hold the student into the hill.

Quadski Tethering

Biski tethering using two tethers



Biski tethering using a single tether

Ski Lift Procedures

These are general instructions for the loading and unloading sitskis on chair lifts. Local regulations may dictate slightly different procedures due to chair or loading area configurations. Check with the Program Coordinator and the Hill Operations Manager for any variance from these instructions. Keep in mind these are general guidelines for lift-loading assistance.

When loading and unloading a chair lift, you must:

1- Always practice the lift loading procedure prior to getting in the lift line.

2- Remove the lifting mechanism pin or locking device on the sitski prior to loading sitski (usually in the lift line up)

3- Ask to slow or stop the ski lift for a first-time use.

4- Make sure that the uphill lift operator is aware that you are coming and that there is a slow or stop device on the ski lift.

5- Should you use a snowboarder as lift assistant, position the board on his toe-side facing the sitski, so they are facing the individual sitting in the sitski and adopting a natural position to assist with loading.

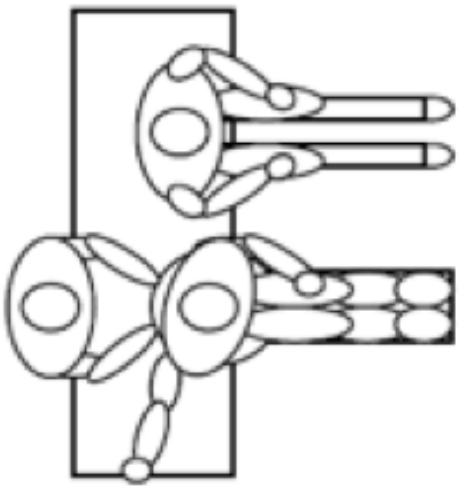
6- Attach the safety strap to the back of the chair lift with a non-locking carabiner or hold the back of the sitski once on the chair

7- Always bring the safety bar down once loaded and avoid using the chair foot rest. When the safety bar is in the down position use care as to how much pressure is being applied to the student's legs.

Loading

Depending on the size of both the instructor and the skier, as well as on the skier ability level and the instructor's experience, a 2:1 ratio should be required. The instructor always lifts with a straight back, in a wide stance and using both legs and arms.

- Ensure proper communication between the skier, the lead instructor, the assistant instructor and ski lift operator.
- There are four different methods that may be use with sitskis: 1) Pull-back, 2) Lift and Pull-back, 3) Lift with a Front Push-back and 4) Lift with a Side Push-back. Remember that one lift operator should always attend the stop button in case of a problem or a fall when loading! If a second lift operator is available, that person may assist with the lift loading.



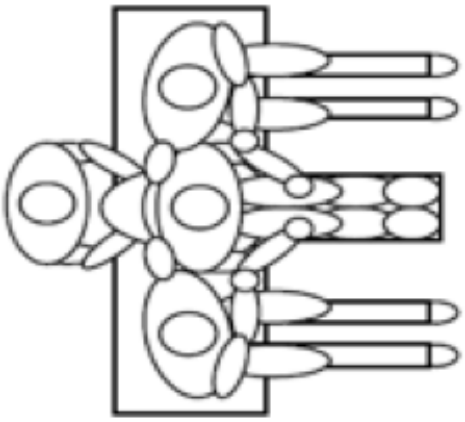
Don't forget to take out (pin) or unlock any sitski system or device prior to loading.

1. Pull-back

The lift operator reaches over the chair, grasps the back of the sitski and pulls it back onto the chair. This is usually used for fairly independent skiers or in the learning process of loading.

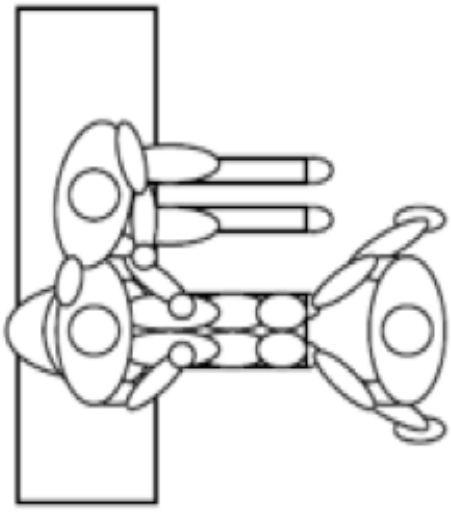
2. Lift and Pull-back

The lead instructor and assistant instructor stand on either side of the sitski, with skis pointed in the ski lift direction, hips and shoulders turned slightly toward the sitski and chair. They grab the side seat's handles. While they are lifting up and back from the sides, the lift operator reaches over the chair, grasps the back of the sitski and pulls it back onto the chair. If a lift operator is not available for lift-loading assistance, the lead instructor and assistant instructor may perform a lift up and pull-back on their own. Always use proper lifting techniques.



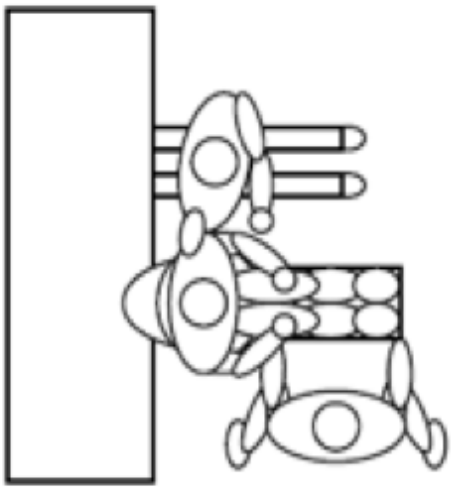
3. Lift with a Front Push-back

The instructor stands at the side of the sitski, with skis pointed in the ski lift direction, hips and shoulders turned slightly toward the sitski and chair. The lift operator stands in front of the student, looking directly at the student and the on-coming chair, grasping the sitski footrest with both hands. While the instructor lifts up and pulls back from the side, the lift operator lifts from the front and pushes the seat up and back onto the chair. This method is used for a person in a monoski or advanced bi-ski who has one or two people assisting with the loading on to the chair. It can also be used for a fairly independent skier.



4. Lift with a Side Push-back

The instructor stands at the side of the sitski, with skis pointed in the ski lift direction, hips and shoulders turned slightly toward the sitski and chair. The lift operator stands on the other side and at 90 degrees to the ski lift direction. The instructor and the lift operator grasp the side handles and lift up. The instructor pulls back while the lift operator pushes back.



Assistance in self -loading

The instructor stands at the side of the sitski, with skis pointed in the lift direction, hips and shoulders turned slightly toward the sitski and chair. The skier self-balances, flips-up outriggers, and gets ready to push up and back onto the chair. The instructor could do a countdown as the chair lift approaches.

The instructor still stands on the side and gets ready to physically assist the skier. As the chair lift approaches, the skier pushes up and back onto the chair lift. The instructor could grasp the back handle to assist the loading and loading direction.

As soon as the sitting position in the chairlift seat is attained (as far back as possible), the skier reaches up and pulls down the safety bar. The instructor still assists the skier by slightly holding the back of the seat. In some occasions, side handles can be used but if used to pull hard, it will make the sitski pivot the seat.

Unloading

Unloading a sitski from a chair lift requires the instructor to refer to the following checklist:

- Have the skier place the outriggers in a ski position held forward on each side of sitski.
- Unclip the safety carabiner from the back of the chairlift.
- Raise safety bar.
- Instructor should always have a firm grip on the side seat and back seat handles to prevent premature unloading.
- Make sure the sitski points straight towards the unloading ramp.
- Once at the unloading ramp, a small push from the instructor may be needed to move the sitski.
- The first two or three times the skier uses the ski lift, you can ask the lift operator to slow down or stop the chair lift as needed so the skier can unload safely.
- Just as the skis are at the unload area, have the skier (where possible) try to shift weight forward to help the sitski slide off the chair lift. This will enable the skier to play an active role in the unloading process.
- Make sure that you replace the lifting mechanism pin or locking device on the sitski system prior to skiing away.

Chair Lift Evacuation:

Ski lift Evacuation Plan: There will be a policy and procedure in place at each hill/resort, therefore the adaptive ski instructor should be aware of the procedure before using any ski lift. Each sitski is required to have an evacuation strap system with locking carabineer as part of the sitski equipment. Most sitski manufacturers do offer the evacuation strap system as regular equipment; however, second-hand sitskis may not have it. It is the skier and each CADS program's responsibility to have it installed properly.

Falling/getting up with assistance:

Take advantage of a fall to demonstrate getting up with assistance:

- Make the necessary rotation until the skiers skis are downhill and perpendicular to the fall line. It is recommended to do this rotation of the sitski in a backward direction so as not to gather snow in the seat of the sitski, as this can cause the skier to get cold and also to not be off balance in the sitski.
- Place downhill outrigger across skiers' chest and uphill. Place uphill hand on the snow, combine push with outrigger and hand until upright;
- The assistant placed sideways to the sitski and exerts pressure with one of his skis on the downhill ski of the sitski while pulling the sitski; you may want to remove your skis and use your ski boot to put the pressure on the sitski to avoid damaging the base/edges of your skis.
- The skier assists by pushing up with the outriggers until attaining an upright position;

Other adaptive ski equipment that may be used

Quad ski

The quad ski is a bi-ski with fixed outriggers. It may also have a hand rest for the skier to hold onto and a back bar allowing the ski instructor to drive the quad ski from the back (bucketing or thumbing). The skier does not have the strength or muscle coordination to hold the outriggers for stability and control.

The skier will always be tethered or driven from the back of the seat using the back bar. It is not recommended to use regular outriggers and fixed outriggers at the same time.

Using a quad ski will require the use of a thoracic band and shoulder straps. More foam might be also necessary on each side to fill any space between the skier and the seat bucket.

Finally, because the amount of work done by the skier is limited, the individual might get cold faster and therefore, you should be aware of signs of hypothermia. You should also check for signs at the bottom of the hill.

NOTE: If bucketing or thumbing is the chosen method, then the fixed outriggers should be removed for safety and ease of movement and control. The person driving the sitski from the back MUST be tethered at least by the non-dominant wrist when doing this technique.

Quad ski Teaching Technique

Quad ski teaching requires the ski instructor to do most of the work. The tethering technique must be mastered before tethering an individual in a quad ski. Before doing so, refer to the above tethering technique drills section. Once the tethering skills have been acquired, here are suggested steps that you can follow for teaching:

After fitting the individual properly into the seat, strap the belt(s) tight. Use as many straps and belts as necessary for body control, balance and safety.

Step 1: (on a flat terrain or on a beginner hill)

Get the fixed outriggers set as large as necessary to secure balance. This will increase the stability of the quad skier and reduce the chances of tipping over.

As in the picture, the quad skier who has upper muscle control of the head position is using that ability to incline the sitski equipment inside the turn, thus edging and pivoting using the shape of skis. The ski instructor tells the quad skier when to use that ability using a countdown (ex. 3, 2, 1 right turn), thus helping him/her to get ready at the right time for the action. While guiding the quad skier to do some of the work, you also make sure that the quad ski is stable by pulling inside the turn the equipment until the uphill fixed outrigger is on the snow. Moreover, this position also promotes turn shape but, because the fixed outrigger, the radius of the turn is likely to be a lot bigger.

Step 2: (Turn Rhythm)

Practice verbal command using the individual's abilities. The instructor is giving the command word for turning into the desired direction and the quad skier helps incline / steer in the same direction using whatever muscle group the individual has control over.

Practice both sides and also give command for a neutral body position. Depending on the ability of the individual, the ski instructor could also used a 3 to 1 countdown for each turn,

Step 3: (Turn)

Challenge rhythm by modifying turn radius. The instructor is still required to pull the seat inside the turn, but ask the individual to do more of the edging movement. The instructor is giving the command word for turning into the desired direction and the quad skier helps incline / steer in the same direction using whatever muscle group he has control over.

Step 4: Turning Challenges

When the individual has mastered the required coordination and rhythm for each turn, you may challenge balance by slightly reducing the width of the fixed outriggers and look to increase the speed and/or progress onto steeper terrain.

Note: fixed outrigger set up can be changed to facilitate turn shape and various terrains, for example, out front and wide setting for gentle terrain and back and in setting for steeper terrain.

Quadski tethering

Back Bar (Bucketing or thumbing)

This adaptation made by some manufacturers definitely helps the ski instructor to drive the sitski with total control. Here, the instructor is responsible for balance, speed control, edging and pivoting. At this point, using fixed outriggers would reduce the driving flexibility of the instructor and would have safety consideration. Therefore, we do not suggest that fixed outriggers be used while bucketing/thumbing a sitski. The instructor MUST also be tethered at least by the non-dominant wrist when doing this technique.

Grip Glove

Adapted gloves are available and aim at increasing the grip, hand stabilization, and individual's control over the outriggers. Many are adapted like an orthoses and therefore are individualized.

Safety concerns

Some medical concerns associated with skiers include bladder management devices (e.g. Leg bag, catheter, etc.), pressure sores, spinal fusion, sensitivity to heat or cold and poor circulation.

Another point of concern is autonomic dysreflexia. This is a potentially life-threatening, hypertensive occurrence produced by the body's inability to sense and react to specific stimuli. Possible symptoms include a feeling of impending doom, flushing of the skin, sweating, blurred vision and a sudden change in the ability to comprehend or communicate. Common causes include bladder or bowel distension, pressure sores, chills and heat stroke, or severe blows to the body or head.

If an instructor suspects autonomic dysreflexia, immediate action should be taken to eliminate the cause. The student is kept upright, straps are loosened and the individual is taken to a warm place. Ski Patrol should be called immediately—this is a medical emergency. Medications taken by the student can also be a source of concern.

Safety Recommendations:

- It is strongly recommended that all individual using a sitski wear a helmet to promote safety in the event of a fall or striking or being struck by the skiing public.
- It is strongly recommended that individual using a sitski should also wear eye protection.

9.5 - Autism Spectrum Disorder

Overview

Autism Spectrum Disorder (ASD), also referred to as autism, is a neurological disorder that causes developmental disability. Autism affects the way the brain functions, resulting in difficulties with communication and social interaction and may also include unusual patterns of behaviour, activities and interests.

The term "spectrum" refers to a continuum of severity or developmental impairment. "If you've met one person with autism, you've met *one person with autism*." ***There is a huge range*** *in language skills, attention span, interests, sensory sensitivities, etc.* Individual with ASD usually have particular communication, social and behavioural characteristics in common, but the conditions cover a wide range, in:

- Number and kinds of symptoms
- Severity: mild to severe
- Age of onset
- Levels of functioning
- Challenges with social interactions

General Categories

A. Persistent deficits in social communication and social interaction across contexts

B. Restricted, repetitive patterns of behaviour, interests, or activities

C. Symptoms must be present in early childhood (but may not become fully manifest until social demands exceed limited capacities)

D. Symptoms together limit and impair everyday functioning.

Please note, in the past what is now known as Autism Spectrum Disorder was broken down into several different diagnoses, including Asperger's Syndrome. There are some individuals who continue to identify with this label. A person who is identified or who self-identifies as having Asperger's syndrome is with on the autism Spectrum. However, only few individuals with autism have Asperger's.

Strengths Exhibited by Individuals with Autism

Although some areas of development in an individual with autism are delayed, people with ASD often exhibit skills beyond their years in other areas. These intellectual strengths may overshadow the developmental problems experienced by the individual. These strengths may include one or more of the following:

- Non-verbal reasoning skills,
- Reading skills,
- Perceptual motor skills,
- Drawing skills,
- Computer interest and skills,
- Exceptional memory,
- Visual Spatial abilities,
- Music skill,

Weaknesses Exhibited by Individuals with Autism

The above exceptional skills may be combined with subtle or significant delays in other areas of development. All individuals with the diagnosis demonstrate some of the following:

Impaired Communication

Communication may range from: limited / no speech à typical speech. Difficulties using and understanding verbal and non-verbal language are exceedingly common in individuals with autism. Deficits can be found in these areas:

- The development of spoken language - no speech.
- Responses to the communications of others (e.g. does not make eye contact).
- Failure to initiate or sustain conversations (e.g. taking turns speaking).
- Pronoun confusion (e.g. I vs. you).
- Stereotypical and repetitive use of language (using lines from a favourite movie to communicate).

- Idiosyncratic use of words and phrases (e.g. always salutes and says "Yes sir" when given a direction).
- 'Choppy' language.
- Repetitive language.
- Difficulty staying on-topic.
- Poor conversation skills.
- Abnormalities in pitch, stress, rate, rhythm, and intonation of speech.

Communication involves both understanding language (receptive skills) and providing information (expressive skills). The abilities of these individuals vary widely in that some individuals with autism will have a good grasp of comprehension (e.g. "sit down") but lack expressive skills (e.g. "My head hurts") and vice versa. Regardless, many individuals with autism experience difficulty with non-verbal communication (e.g. eye contact, facial expressions, smiling, etc.). People with autism often fail to understand words or phrases that are abstract (e.g. "We'll go swimming later" or "I love you") or that have a double meaning (e.g. the teacher says to a person with autism, "Clear off the table" and she/he pushes everything off it). They also tend to interpret things very literally (e.g. "Give yourself a hand").

Some individuals exhibit echolalia, which is the repetition of words, signs, phrases or sentences spoken by other people. Some individuals use this as a communication device (e.g. the instructor says "Do you want a muffin?" and the person might say "Want a muffin" to mean yes). A person may repeat the same phrase over and over again as a means of regulating his own behaviour (e.g. a person repeats aloud "Time to clean up" while cleaning).

Individuals with Autism may also use alternative, non-verbal methods of communication (Sign language, picture communication systems; technology (iPad).

Impaired Social Skills

Lack of Awareness

Individuals with Autism, often have challenges with social skills. The way these difficulties present themselves can vary widely. Challenges may include an irregular way of approaching a social situation, or the individual may lack the skills to initiate social interaction of any kind. In a conversation with a person with Autism, it may be difficult to engage in a dialogue, which moves back and forth between speakers. It may also be challenging for individuals to understand how to share interests or emotions with others.

Autism is characterized by an impaired ability to engage in social relationships and can result in serious deficits in the ability to make friendships. In fact, some individuals with autism may behave as if other people do not exist.

This is demonstrated in various ways, including:

- Failure to respond to their names when called,
- Appearing not to listen when spoken to,
- An inability to display appropriate facial expressions,
- Avoidance of eye contact,
- A failure to respond to affection,
- Sometimes treating people as if they were inanimate objects,
- Will acknowledge an adult only for the purpose of getting a need gratified and will return to ignoring the adult thereafter.

Impaired Social Skill / behaviour	Example of what it might look or sound like?
Individual with awkward social initiation	*Awkward conversation* • Instead of starting the conversation with "hello", the individual immediately asks a question "Why are you wearing a green jacket today?" *Awkward entry into play situations* • By appropriate play we mean when a child joins to play with other children, they play and create together. • Instead of appropriately joining into play with some children who are building a snowman, the child with ASD walks straight through the middle of the group and removes the stick arms.
Individual with little or no social initiation	• Child talks with adults but never initiates with other children. • Individual is in his or her 'own world'.
One-sided conversations	• Conversations feel like an interrogation: the individual with ASD asks a series of questions. • *Or* you keep asking questions to continue a conversation: the individual with ASD does not contribute any comments or questions.
Struggling with perspective taking	• Individual has trouble with sharing, turn-taking. • Individual has difficulty understanding rules in complex games. • Individual gets upset when other people break the rules.

If a person with autism possesses any social skills, they can be rote and awkward in nature. Individuals with autism may also experience problems maintaining reciprocal relationships. Additional difficulties center around an inability to take on another's perspective (e.g. a person with autism hurts someone else and cannot understand why they are crying). Individuals with autism may also have difficulties expressing feelings and emotions, or provide or seek comfort, in unconventional ways.

Individuals with autism may also experience difficulties with aspects of nonverbal communication, which are used during social interactions. Challenges may range from abnormalities in eye contact and body language, or deficits in understanding and use of nonverbal communication, to total lack of facial expression or gestures.

Impaired Social Skill / behaviour	Example of what it might look or sound like?
Individuals who take you literally.	• An individual who doesn't read your expression & tone • Difficulty with sarcasm • E.g., Individual looks concerned when you say "Wow, you are really *on fire* today!"
Individual doesn't make or sustain eye contact.	• Many individuals with ASD may not sustain eye contact • Some individuals will describe this as being able to look at you OR think about what to say. One or the other, but not both at the same time.

Abnormal Seeking of Comfort When Stressed

Individuals with autism tend to crave predictability and function optimally in highly structured situations. Concurrently, they are likely to become extremely dependent on elements of sameness in their lives, to the extent that they can have difficulty coping with changes in their environment or routine.

Impaired Imitation Skills

All children learn behaviour patterns of social interaction through imitation. Very young children with autism may fail to respond or exhibit delays in responding to the gestures or playful overtures of peers, even when these are familiar to them from past experience or through repetition. Without direct and carefully planned intervention efforts, as a child with autism grows older, their capacity for benefiting from the opportunities they may encounter for imitative learning will continue to be limited.

Abnormal Toy Play

When a child with autism sits down to play, they generally have a stereotypical and repetitive approach as opposed to the symbolic, creative and imaginative play behaviour exhibited by the typically developing child. Some children may refuse to play with toys, or if they do they may do so in unusual ways. They may not see a toy car as a car but rather as an object that rattles and makes funny patterns when the wheels are spun. This unusual toy play probably accounts for part of the reason why these children have difficulty interacting with peers and joining in games with others. Later in life, difficulties with play skills may affect the ease with which an adult interacts with their peers in social situations.

Difficulty forming relationships

When an individual with autism has deficits in developing and maintaining relationships, appropriate to their developmental level (beyond those with caregivers); they may experience challenges ranging from difficulties adjusting behaviour to suit different social contexts through difficulties in sharing imaginative play and in making friends to an apparent absence of interest in people.

Impaired Play Skill / behaviour	Example of what it might look or sound like?
One-sided play	Individuals who may be very imaginative, but have a hard time engaging others in their stories. Individual appears to be 'bossy': has not yet developed perspective taking skills.
Withdrawn behavior	Individual wanders around, more interested in other aspects of the environment (e.g., the feeling of the snow, how the snow looks as it falls through the light).

Individuals with autism may lack two essential skills that are vital for peer connections:

- The ability to relate to peers in a positive and reciprocal manner; and
- The ability to adapt interpersonal skills to the various demands of different social situations.

These individuals are not out looking for opportunities to interact and may even find it difficult to be in the physical proximity of others. Typically peers do not seek them out.

Perseveration on Interests and Activities

"Perseveration" is when an individual becomes 'stuck' on a topic, word, thought, activity, item, problem-solving strategy or emotion and has trouble moving on. Individuals with autism may have a narrow range of interests (e.g. a child will only go to play in the block area of the classroom). They may also engage in repetitive, stereotyped body movements such as hand flicking, spinning or rocking. They may insist on carrying certain objects around with them to keep from losing control or to help them feel secure. Perseverations might extend to food. A person with autism may have a preference or dislike certain colours, textures or temperatures of foods. Some individuals perseverate on certain topics. The person might remain intrigued with one or two topics, such as music or modes of transportation, and exhaust everyone who comes into contact with them about their knowledge in that area of interest.

Dependence on Routine

Individuals with autism may be dependent on a set routine and can become extremely stressed when this schedule is not followed to the letter. An individual might insist on a certain routine. Behaviour problems (e.g. screaming, crying, hitting, kicking, throwing objects, self-injury, etc.) or excessive adherence to routines, ritualized patterns of verbal or nonverbal behaviour, or have excessive resistance to change such as specific rituals, insistence on same route or food, repetitive questioning or extreme distress at small changes may occur as a result of changes in routine.

Dependence on Routine	Example of what it might look or sound like?
Routine with activities	Individuals who are stressed when the schedule changes *"It's 9:07 in the morning- we always catch the gondola at 9:07."* Individuals who are really stressed when there's something new *"Why is the line on this side tonight? We always line up on the other side…"* Individuals who ask the same questions over and over again *"When are we going to…?"*
Routines with objects	Individuals who line up/arrange objects in particular patterns, such as toy cars or foods on their plate.

Abnormal Responses to Sensory Stimulation

Individuals with autism may experience hyper- or hypo- reactivity (refer to table below for definition) to sensory input or exhibit an unusual interest in sensory aspects of environment such as: apparent indifference to pain/heat/cold, adverse response to specific sounds or textures, excessive smelling or touching of objects, fascination with lights or spinning objects.

Sensory difficulty	Example of what it might look or sound like?
Hyper-reactivity *Greater than expected reaction*	Individuals with their hands in their ears. Individuals who are fascinated by sand and water. Individuals concerned about clothes being too itchy. Individuals who hate to get dirty.
Hypo-reactivity *Less than expected reaction*	Individuals who don't react to pain. Individuals who don't react and, appear not to hear loud noises.

Individual with autism may exhibit unconventional reactions to sensory stimulation. Some individuals show a hypersensitivity to stimuli (e.g. can hear lights buzzing, cannot tolerate touch, fascinated with spinning objects, must smell everything, etc.) while others display a hyposensitivity to stimuli (e.g. demonstrates high pain tolerance, act as if deaf, etc.). A person with autism may be fascinated with a piece of lint, or may spend hours rocking or watching objects twirl. In general, these types of reactions are providing some sort of sensory stimulation for the person.

It is believed that these sensory difficulties stem from neurological dysfunction in the brain. We are bombarded with thousands of sensations daily. Our ability to integrate these sensations by attending to the important ones and filtering out the non-essential input helps us to function efficiently. Without smooth functioning of this system, the individual is unable to accurately interpret his environment and respond and adapt.

Behaviour Problems

Behaviour problems can also be associated with individual with autism. These can include incidents of tantrums, self-injury, property destruction, and acts of aggression. Some behaviours are the result of developmental deficits (e.g. a person cannot speak and engages in challenging behaviours as a form of communication).

Episodes of self-injury can be in response to abnormal response to sensory input. Regardless of the cause, when a person is performing self-stimulating behaviours (e.g. hand flapping, twirling, finger posturing, etc.) it is often difficult for the individual to be able to focus on learning.

Variability of Intellectual Functioning

A characteristic of people with autism is the wide range of functioning within which they can fall. Individuals with autism can be severely impaired to the extent that they are unable to talk or perform independent living skills, or they may be functioning in the above-normal range of intelligence and able to go to college, have a career, and start a family.

Uneven Development Profile

Individuals with autism exhibit a splintered development profile, being able to function in some areas at levels higher than their overall level of functioning. For example, a five year old with autism may be reading books at a second grade level while their self-help skills are at an age- appropriate level and their social skills abilities are virtually non-existent.

Difficulty Sleeping

Some individuals with autism have trouble falling asleep or require only a few hours of sleep each night to function. This can be extremely problematic for families and makes it difficult for parents who start sleeping in shifts to prevent the person from getting into trouble around the house. Difficulty sleeping may extend to adulthood. When an individual is sleep-deprived it may make it difficult for them to perform physical activities, concentrate or to learn.

Eating challenges and special diet

Some individuals with autism are picky eaters, and their diets may be limited to a few preferred foods. This self-limiting has often been attributed to food intolerance. There are also many individuals with autism who are on specialised or restrictive diets, imposed by health care practitioners or families. It is important that the parent or caregiver first approve any food or drink items offered to a child with autism.

Gastrointestinal Problems

Many individuals with autism have problems with toileting, often related to sensory issues or actual gastrointestinal problems. A great many have diarrhea or constipation, abdominal pain, gaseousness and bloating. These gastrointestinal problems may cause great physical discomfort for the individual, and could be the cause of poor sleeps habits. These difficulties may also make learning and focusing a challenge.

Motor Skill Problems

Many individuals with autism have motor skill challenges. Although this is not a part of the diagnosis of autism spectrum disorder, it is relatively common for individuals to have difficulties with gross motor skills (balance, coordination, speed limp, agility, simple and complex reaction time), motor planning skills, and fine motor skills. Low muscle tone, hyper flexion of joints, toe walking, clumsiness and an unusual or irregular gait are also relatively common, and may affect the ease with which an individual participates in snowsports. These challenges may also be a safety concern because they can lead to a decreased ability to negotiate obstacles in the environment.

Interacting with an individual with autism

The complexity of autism makes it difficult to establish a general set of strategies that will enhance interaction. The following guidelines provide a starting point. Establishing a rapport with the student with ASD is an important first goal.

- Talk less, listen and observe more.
  - Too much talk can be overwhelming for an individual with autism.
- Use 'Show AND Tell' as much as possible.
  - Many students with ASD are strong, visual learners. A Standing or sitting side-by-side approach when demonstrating is often easier for the student to comprehend.
- Reduce the directive approach and use an open-ended approach with choice or forced choice.
  - "We are putting our skis on and we can walk around here by the door or over there by the sign."
- Avoid asking a Yes / No question if you are not prepared to honour a No answer
  - Try using language like, "it's time to go skiing" or "Let's go skiing", instead of "do you want to go skiing?"
- Break the task into achievable pieces.
  - Beginning points may include putting on ski boots and walking around inside before going outside, for example. Build success on what the student CAN DO.
- Give time to process
  - The instructor might have to pause and count 1..2...3..4...5..in their head to allow the student time to respond before repeating the instruction/question, or utilising additional teaching strategies or communication methods.
- Utilise Repetition
  - Students may need to practice a task many times before they have mastered it. Allow time for a student to hone their skills before moving on. Review; Re-teach; Repeat and Practice.
- Ensure your communication matches the ability of the student.
  - Use a communication style, pace and type that fit within the student's ability.

Support Strategies

Remember: "If you've met one person with autism, you've met ONE person with autism."

- Always be thinking about the individuals on the spectrum you support as individuals.
- Personal preferences, strengths, learning styles, dislikes, etc.
- Not every strategy will be a good fit for every person in every situation.
- Work as a team to understand the situation and match the appropriate strategies.
- If working with a child, collaborate with parents / caregivers to understand **individual** strategies.
  - *3 great questions to ask parents/caregivers:*
    1) *What does your son / daughter like? (Use this information to build rapport)*
    2) *Is there anything I should avoid?*
    3) *Is there one support strategy you would recommend that I definitely use?*

Communication Tips

- Use short, clear phrases ("Hands here" "Bend knees" "Arms out")
- **Show and say:** Pair words with pictures, models, gestures, visual cues, text (lists, schedules, etc.)
- **Be specific and direct**
  e.g., Instead of "wait nicely": say what you want to see : You can sit here or stand there. You can talk to your friend or play in the snow.

Show and say: Instruction: "Athletic stance"

Teaching strategy (pair with instruction)	Example of what it might look like?
Picture	Show participant a picture (stick figure) that highlights the most relevant parts of the skill: • Knees bent • Elbows at sides • Head up 
Gestures/Modelling	Have a volunteer standing in front of the participant modelling the skill.
Video modelling	Make a short video on an iPhone/ iPad of someone demonstrating the skill.
Visual cues	Draw lines in the snow to show how far apart the feet should be.
Text	Write a list of the key parts of athletic stance. Have the participant make sure they are doing each component of the skill by referencing the checklist.

Behaviour Support Tools

Here are a few tools that might be useful to help with your lessons. These examples work best with children, but some strategies may also be useful with adults. If using with adults or older individuals, please ensure the tools are age and developmentally appropriate:

First-Then

Set up the board to show the individual a fun activity that will happen after a less favoured activity is completed- e.g., "First turns, then chair lift."

Why / When	Examples
Helps motivate individuals through more challenging / less preferred activities Helps individuals see 'the light at the end'	"First snow plows, then build snow man." "First 1 more run, then hot chocolate."

You can do this with a visual support (see below / pictogram) or just provide the verbal reminder.

Countdown Strips

The person will tear off one number for each repetition of the activity (e.g., 1 for each turn, or stop, or ski run completed.)

Why/When	Examples
Shows individuals how many more they need to do Prevents nagging ("The board says we need to do 5 more") Helps to stretch out the first-then to increase expectations over time	"Three turns… 3…2…1… All done! Fantastic!" "First 5 more stops, then snow man"

You can start with a smaller number on the board, then gradually increase to five as the individual becomes more cooperative.

Token Boards

The individual earns 'points' towards a preferred activity.

Why/When	Examples
Helps to motivate individuals to complete a variety of activities Ensures that the instructor provides positive feedback throughout each completed task: many individuals are very motivated to earn each token! Helps to gradually increase expectations over time *The first day the individual earns one point/token per turn: the second day the individual needs to complete* 2 turns to earn a token/point.	"Ok, for your first point, I need to see you do 3 amazing stops!" "For your next point, I would like to see you complete 5 awesome parallel turns!" "Great job watching the model" you earned a token

Timers

Timers can really help to smooth transitions between activities. You can use them in 2 ways:

Why / When	Examples
1. To transition away from a **preferred** activity to a skill with clear expectations.	"2 more minutes building the snow man, then it is time to ski again."
2. To show how much time is left before a less preferred activity ends.	"Just 5 more minutes, then we will go inside for hot chocolate."

You can start with a short amount of time, then increase as the individual's endurance/ attention/ engagement improves. Counting down verbally or using fingers can also be an effective way of indicating the end of an activity. E.g. "5…4...3…2…1… the snowman is all done, its time to go skiing"

Types of timers:

Time Timers iPhone Timer App Countdown App

Choices

Research shows that simply by offering more choices, problem behaviour is reduced. Even 'small' choices can make a big difference.

Why / When	Examples
Offer choices as much as you can!	Choose the run, this one or this one? Which boot do you want to put on first? Do you want to make a snowman or snow angel? Do you want to use this stick or this stick for his arm?

Choices can be:

a) verbal,

b) written, or

c) you can use a visual choice board with picture symbols:

CHOICES		
Play with snowballs	**Build a snowman**	**Go snowboarding**
		

More pictograms example in an alpine snow sports environment are presented in Appendix 9.

Visual Schedules

We all like to know what is happening in our day! Providing a visual schedule reduces anxiety for participants by showing them what is planned. Some participants need to have the schedule with them at all times and need to see each activity 'crossed off' as it is completed- other students will be fine with just seeing a general outline at the beginning of the lesson.

Why / When	Examples
Picture schedules	Younger students / Emerging readers.
Written schedules / Lists	Older students, Readers.
Electronic schedules (iPad)	Where the technology allows. When the parent / caregiver strongly recommends.

Picture schedules:

Show the participant the outcomes of their choices. Helps with thinking through / thinking ahead and seeing the consequences.

Why/When	Examples
Frontload: Remind, and show the participant in advance what you would like to see and the great things that will happen when they make a good choice.	Remember, if we get wait nicely in the line each time tonight, we get to have hot chocolate at the end! But - if we do not wait nicely - there will be no hot chocolate

Wait Cards

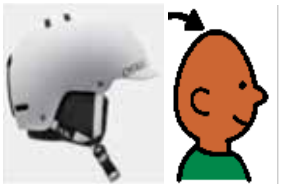
Makes waiting a more concrete activity- i.e., waiting means 'hold the card'- when I take it from you, it will be your turn.

Why / When	Examples
Waiting in line for the chair lift	Hand participant the card - "now we need to wait for our turn to ride the chair lift. Hold on to your waiting card." When it is your turn- ask the individual for the card: "Waiting is all done! Let's move forward and get ready to sit down!"

Visual Supports for Teaching Safety

You may wish to develop specific visual supports to teach important concepts, such as how to wear equipment safely. Here are some examples:

FIRST **THEN**



If they don't wear the equipment properly, picture what is wrong and then what is correct

Social Stories

Many individuals with autism are familiar with 'social stories.' Social stories are short stories that provide individual with information about what to expect for a new routine: e.g., When skiing, first you will ride the gondola. In the gondola, there will be many people, and it might be noisy. These stories usually have pictures that correspond with the specific location where the routine will occur.

It's OK to fall down! I can get back up.
If I need help, I can ask my ski or snowboard instructors

Assessment of Abilities

This Assessment of Abilities process is referred to AOT - Ask, Observe, Test and is discussed in more detail below."

Because the ski teaching techniques / progression and the lessons are chosen and planned for an individual's specific needs, it is fundamental to know what their capabilities are. The best way to find out is to first ask and observe everything about communication strategy, behaviours, what they like & dislike, secondly to observe and test mobility, balance, coordination and strength in order to evaluate how their body can move and achieve the movements that we require for skiing.

Understanding the skier's mobility and strength levels is essential to working with and adapting to these capabilities in order to experience the greatest success on the snow.

The focus is characteristic associated to communication, behaviour and understanding then on stance and balance:

Essentially, it returns to the CSIA's basic skier competencies: centered mobile stance, steering with the lower body if possible and balancing on your edges.

Ask

Being aware of an individual's specific disability, an adaptive ski instructor needs to focus on a student's potential while recognizing any challenges that s/he may have.

Therefore, as a CADS ski instructor you need to be aware of how independent or dependent the individual is. For school aged individuals an understanding of the degree of support the skier receives in school may shed insight into this question.

The Ask section of the AOT will guide you through three separate sub-sections: Cognitive, Physical and Related activities

About children from a care-givers / parents perspective.

Ask	Look for
What does your child like?	Activities, interests, characters, creatures, objects, ideas, words, sounds, foods etc. This information can be used to build rapport and motivate a student to participate in snowsports.
Is there anything I should avoid?	Triggers situations that may cause the student to become anxious, worried or engage in challenging behaviour. (loud noises, certain phrases or words, chairlift rides etc.).
Is there one support strategy you would recommend I definitely use?	Utilize the parent's / caregiver's extensive knowledge of their child. Strategies that support a fun, relaxed learning experience while ensuring the child's safety.

About Cognitive, questions to Ask

Ask	Look for
What learning style best represents the skier's learning?	Verbal, Visual, Auditory / Musical, Physical / Kinesthetic, Logical, Social, Solitary or a combination of learning styles to best suit the skier needs.
Does the skier require the support of an educational assistant at school for academics, lunch time, and recesses, extracurricular activities, physical education class?	Assess independence in daily activities and how that relates to skiing. A skier who requires only support for academic learning is more independent than someone who requires an educational assistant during learning, recess, eating, toileting etc.
Does the skier respond best to: a male or female instructor? Specific character traits? Vocal level / tone?	Reactions to instructions given in different tones, by different genders, different volumes.
Does the skier use any particular learning tools or aids?	Visuals, images, series / schedule boards, iPads, sensory therapy tools, timers, sensory balls, weighted garments, earphones.
Does the skier use any tools for communication?	Photo cards, iPads, flashcards, sign language, PEC (picture exchange communication device), Augmentative Communication Devices (iPad).
Are there any learning strategies that have / haven't worked in the past?	Why were these techniques effective / ineffective? Look for techniques that can be applied to skiing.
Are there any specific learning strategies that are being implemented at home / school?	Helps maintain consistency in learning through the different activities the skier participates in. Look for techniques that can be applied to skiing.
Are there any other tips / strategies that can be used to help manage behaviour or lower stress / anxiety?	Calming words, token systems, "if, then" wording sequences, positive reinforcements.
Does the skier have any sensory triggers or sensitivities the instructor should be aware of?	Light, sound, touch, clothing texture, temperature, overwhelming stimulation (noise, crowding, confined space/ heights, i.e. chairlift).
Does the skier have any specific likes / dislikes, interests, favorites?	Topics / passions that can help maintain focus and interest.

About Physical questions to Ask

Ask	Look for
What other sports does the individual practice? Do they participate in physical education at school and if that is so, what are the accommodations made?	Sports that require balance, strength and mobility might transfer some motor skills ability into ski.
Do they think of themselves as fit and active? If so, why?	The ability to correctly self-evaluate.
Have they used any other specialized adaptive sports equipment?	Sports equipment that could be related to skiing.
How long can they stand / walk?	Gauging their stamina levels will guide how you will pace the lesson.
Have they skied before?	Figuring out the student's skiing history, i.e. when, how often, the last time they went skiing etc., will assist the instructor in forming a picture of the student's current skiing ability.
Where do they think their strengths are?	Perseverance, participation in other sports, positive attitudes, determination, self-determination, etc.
What are common challenges the individual faces?	Limited movement, fatigue, balance, coordination, lack of belief in themselves and or their ability, frustration with their disability etc.
How did the skiers overcome these challenges?	If the skier overcame the challenge, how did they do it, look for creative answers? Look for perseverance, etc.
Does the skier have any previous injuries (concussions, sprains, strains, etc.) that would affect their ability to ski?	Taking into account previous injuries to minimize the risk of further injury.
Are there any physical limitations or challenges associated with the skiers' disability?	Muscle weakness, low muscle tone, loose joints, areas prone to stress / breaks, toe-walking, clumsiness, poor motor planning
Does the skier have any physical movements / habits that indicate feelings of stress or anxiety?	Flapping hands, rocking back and forth, etc. can be indicators of elevating stress or anxiety and can be used as an attempt to self-regulate those elevated levels.
Does the student have any gastrointestinal challenges? Have they missed a regular bowel movement recently?	It is difficult to see what is happening on the inside, but if the student is experiencing abdominal discomfort, they may grab their stomach or bend over.
How has the student been sleeping?	There may be physical cues to indicate fatigue or lack of sleep, for example dark circles under the eyes, eyes repeatedly closing or sluggish movements.
Are there any safety concerns the instructor needs to be aware of? For example: elopement. (Elopement is an act or instance of leaving a safe area or safe premises, done by a person with a mental disorder or cognitive impairment).	Find out from the parents or caregivers if there are safety concerns to be aware of. Some individuals with autism are at risk for elopement. It may be necessary to keep a super-vigilant eye on the student or use some kind of tethering device at all times.
Which of the following sports does the skier practice?	Sports that require balance, strength and mobility as transfer some motor skills ability into ski/snowboard.
	Swimming, water skiing, riding a two-wheel bicycle, skating, skipping, plays hockey, plays soccer, plays basketball, plays baseball, bowls, and rides horses.

Observe

Examine the individual as they walk and move around. As you do this, relate the ease of his / her movements to skiing.

Pay attention also to how the individual student communicates, both expressively (how they communicate to you), and receptively (the information they receive).

Observe	Look for	Relate to alpine snow activities
How do the family / caregivers verbally communicate with the individual?	Are the family members / caregivers using full sentences or only 1-2 words at a time?	While instructing snowsports, use words and instructions that match the language the student can understand.
What method of communication does the individual use?	Does the student use one or a combination of the following methods of communication: Verbal communication, Picture communication symbols, Signs language such as American Sign Language (ASL), langue des signes Québécoise (LSQ) an augmentative communication device, e.g. an Ipad with a communication app. See at the end of this module for signs alphabet and number.	It is important for the instructor to use the appropriate method of communication with the student to ensure they are providing the student with the best opportunity to communicate while they are learning to ski or snowboard. A conversation with parents or caregivers may help decide the most appropriate method for communication while out on the slopes.
What type of language can the student understand or comprehend easily?	Is the student responding to your questions? Is the student able to repeat back instructions you have given them?	If the student finds it challenging to answer the instructor's questions or repeat back instructions, this may mean the individual will find it challenging to follow directions. It may be important for the instructor to change the way they are communicating to the student by slowing down their speech, using fewer words, focusing on one task at a time. It may also be beneficial to use additional teaching strategies in conjunction with your instruction. E.g. modeling, physical guidance, visual cues etc.
How does the family-member/ caregiver get the student's attention?	Does the family member/caregiver get down on the same eye-level as the student? Does the family member/caregiver use physical contact, e.g. gently squeezing the student's shoulder?	How well a student can pay attention, can be related to that student's ability to watch demonstrations or follow directions and learn how to ski or snowboard. The instructor may imitate and use similar types of attention-getting methods to ensure the student has the opportunity to learn and participate in snowsports.
Is the student capable of following multiple step directions?	Can the student follow a one-step direction? E.g. Get your boots. Is the student capable of following directions that involve multiple steps. E.g. Get your boots and go to the chair and sit down.	This will determine the types of directions or instructions to use with the student. If the student is capable of more than one direction it is okay to tell them to bend their knees and look ahead. Otherwise it may be necessary to focus on only one direction at a time, and to break tasks into small manageable steps.
What makes the student excited?	Is there anything the student has talked about, or an item the student has with them, that makes them really excited?	A strong interest or object may be used to help motivate the student. Sometimes utilizing the student's interests can help the student to be more engaged in snowsports, which will help the student to listen and learn. It refers to the If - Then - Else methods. Examples: • First we snowboard for 10 minutes, and then we can play with snowball. • First we go skiing, and then we can go inside and play your DS.
Does the student perseverate on particular topics, activities, ideas or interests?	Talking non-stop about a particular subject, topic, activity or interest.	These might be topics, interests or subjects that are best avoided. Or they may be useful as a way of relating to the student or teaching them new skills? E.g. put your skis like railway tracks and be a train.

Observe	Look for	Relate to alpine snow activities
Does the student show signs of hyper reactivity or hypo-reactivity to sensory input, or have an unusual interest in sensory aspects of the environment?	Does the student appear to want to avoid engagement with sensory input? (Hyper-reactivity) Examples: • The student has their hands over their ears in a loud room. • The student finds wearing goggles on their face aversive. • The student can't stop fiddling with the tag on the back of their ski pants. Does the student appear to seek out engagement with sensory input. (Hypo-reactivity) Examples: • The student makes constant verbalizations. • The student wants to repeatedly crash into the snow bank. Does the student appear to have an unusual interest in the sensory aspect of the environment? Examples: • The student wants to watch the chairlifts spinning on the bull wheel repetitively. • The student is fascinated by the texture of snow.	It is important to realize that a student's behaviour may be a reaction to the sensory input in their environment. Students with sensory sensitivities may find some types of snowsports equipment aversive or extremely uncomfortable. It may be important to introduce equipment ahead of time, and slowly build up tolerance towards it. Modifying or replacing gear can also be helpful. For example, using a large translucent visor in the place of goggles. Cutting the tag off a pair of ski pants. It may be helpful to offer the student short breaks to engage with the sensory aspects of the environment, e.g. watching the chairlift or playing with snow.
Does the student show signs of anxiety.	The student may have an anxious or worried look on their face. The student may engage in self-stimulating behaviours such as rocking, flapping, spinning etc.	The instructor may need to spend time building a rapport with the student, and try to utilize coping strategies to help calm the student before it is possible to go skiing. It may be necessary to spend time explaining with words, pictures, diagrams, equipment, etc., what the day will look like.
How are the motor-planning skills of the student?	If a skill is demonstrated for a student, is the student able to execute the correct movements, in the correct sequence?	Motor planning problems are relatively common in individuals with autism. If a student has challenges with motor-planning, it may make it difficult for a student to know what to do with their body and how to coordinate their movements. Skills for skiing may need to be broken down into very small steps, and substantial repetition may be required.
Does the student have low muscle tone?	Muscles may appear and / or feel soft and floppy.	Low muscle tone is relatively common in people with autism. It may make typical movement patterns more challenging. This may affect an individual's strength and stamina. The instructor may need to build in more breaks.
Does the student toe-walk?	Walk on the balls of their feet or tiptoes	Toe walking is relatively common in people with autism. Individuals may also have tight heel cords. This may make it difficult, painful or impossible to wear ski boots.

Observe	Look for	Relate to alpine snow activities
Is the student well balanced while moving around?	Unsteadiness, lack of balance, lack of confidence.	Clumsiness and/or balance issues are relatively common for people with autism. The more unsteady the student is on their feet, the more reliant they may be on the any device that is maid for support, balance and turning.
Is the student looking for additional support to assist movements?	Uses of chair, walking aid, wall or person.	
Is one side of the body stronger and / or is movement easier on one side that on the other?	Asymmetrical movements Weakness originates from the legs, trunk or upper body or a combination of the above	Weakness on one side will affect the turning ability, making one turn more difficult. Weakness in the core muscles will affect lateral, fore and aft balance. Weakness in the upper segment of the body (i.e. arm) will affect the ability to use the equipment on that side.
Does the student have the ability to flex any joints?	Flexion Rotation Pronation	Greater mobility of the joints will facilitate a better center mobile stance.
Does the student have hyper extend of the joints? Does the student have increased or decreased joints flexion?	A student's joints hyper-extend. This may be apparent in their fingers, elbows or knees as the joint is extending further than is normally seen or bend backward. Avoidance of movements and postures that stress the musculoskeletal system may lead to further weakness in anti-gravity positions. A student with increased or decreased knee / elbow flexion.	Hyper extended joints have been found in people with autism. As a result, these individuals experience decreased pelvic control, hyperextension of elbows, knees and fingers while weight bearing, proximal muscle weakness, fixing patterns and further intake of abnormal sensory information. Increased or decreased knee flexion can affect posture and could be linked with low muscle tone. The student may require assistance to maintain a good stance. Ask the student while holding their hand to stand taller. Increased flexibility in elbow and fingers may make the hands less stable and make gripping, lifting and manipulating objects more challenging. Students may require assistance with zippers, boots, bindings etc.
Does the student have an unusual or irregular gait?	Alignment of feet, point out/in, Knock knees or bow legs The alignment originates from spine, hips, knees or ankles. clumsiness? (see above) Knock knees or bow legs The alignment originates from spine, hips, knees or ankles. clumsiness? (see above)	If the foot is pointing out, it may indicate the need for the use of a ski bra to promote the ski tips working together. If the feet are pointing in, the wedge turn will be easier but parallel skiing more difficult. If the foot is pointing in, the wedge turn may be easier but it might be harder to pivot the inside foot when making parallel turns.
Are movement patterns quick or slow?	Quick movement patterns Slow movement patterns	The quicker the movements, the greater the confidence. This can have an effect on lesson pacing as someone that is more steady and mobile will find balancing on a ski easier and therefore, would learn more quickly.
While moving around does the individual display an ability to separate movements between upper and lower body?	Uses the upper body to assist the movement of the lower body. Ability to separate movement of upper and lower body.	The ability to show separation between upper and lower body movements indicates greater mobility and the ability to steer with the lower body while skiing.

Test

Here are six proposed tests relating to movement and levels of strength that will be required for skiing that can be performed whenever necessary. As well as testing a student's physical skills, it may also be important to use this opportunity to test your ability to communicate with your student.

Test	Look for	Relate to alpine snow activities
A student's learning style.	The method of teaching that they respond most to.	This will allow the instructor to use the most effective teaching methods possible for the individual student.
A student's ability to follow the instructor's verbal instructions.	The student will attempt to follow your verbal instructions closely and attentively after they have been given, without further assistance.	To determine what kind of language to use with the student, e.g. sentences or 1-2 words at a time only. It will also determine whether or not the student will require additional teaching strategies in conjunction with verbal instruction. E.g. modeling, gestures, physical guidance, visual cues such as text/ pictures/ snow-drawings, video-modeling.
A student's ability to maintain attention to an instructor's words.	Notice whether the student is imitating your demonstrations or following your directions.	Does the instructor need to change their positioning to the student? E.g. get down at their level. Does the instructor need to talk less? E.g. "Hands on knees." Does the instructor need to use gentle physical contact to ensure the student is able to pay attention? E.g. a light shoulder squeeze.
A student's ability to follow multiple step directions.	Determine whether the student is able to follow more than one instruction at once.	How many steps does the task need to be broken down into to ensure effective learning?
A student's ability to summarize or repeat back the information you have given them.	Inconsistencies or the inability to tell the instructor what was told to the student.	This will give an indication of how much the student understands and help to determine the rate of speech to use; how many words at a time to use and whether additional teaching strategies will be needed.
A student's processing time.	Determine whether there is a consistent delay in a student's response to a question or instruction. Does the student need time to process?	The instructor may need to pause and wait after issuing an instruction or asking a question to allow the student time to process the information.
Balance and endurance	Lost of balance due to leaning or moving laterally or from a fore and aft movement, or due to instability in the torso. When the skier moves around, do you see a decrease of the ability to flex or weakness on one side or the other?	The more instability due to balance when standing , the more reliant on the outriggers for support, balance and endurance. If a weakness appears after a certain period of time, deterioration may be observed of the ability to perform certain manoeuvres correctly.
Flexion and extension	While checking range of vertical movement, focusing on the ability to flex and extend the ankle, knee and hip. Determine if balance is maintained.	This will indicate the ability to maintain a centered mobile stance. The greater the ability to do this while maintaining balance, the less reliant on the outriggers while skiing. The range of movement will also indicate the ability to control pressure at more advanced stages of ski progression.

Test	Look for	Relate to alpine snow activities
Pivot	Ability to rotate the foot and the leg across the body while keeping the upper body still. Upper and lower-body separation. While performing test, observe if the hip and upper body rotate to assist the movement.	This will indicate the ease of the individual to steer with the lower body. The range of mobility the individual demonstrates with this test will indicate the potential to execute pivot while skiing.
Lateral movement	Check range of movement when rolling knee side to side and determine if balance is maintained.	This will indicate the ability to edge a ski and maintain balance while doing so.
Wedge turn	Ability to pivot their feet inward to make a wedge.	The ability to make a wedge turn for a person with autism is a great way to control speed. If not, have the skier sit down on a chair and see if they can make a wedge shape twisting their feet. If not, then you should leave it out and move on to turning to stop. Because some people with autism get 'stuck' in their thinking, it has been suggested that skipping the wedge turn and going directly to a parallel turn may be a strategy worth trying for certain individuals who experience this challenge.
Agility	Ability to walk in a circle in both directions. Examine how they naturally maintain and achieve the change in direction.	The ability to change direction as the individual with ASD walk / run tells the instructor that the better the task is performed the better planification functions are.

Do frequent mobility checks even with skiers with whom you have skied before. You can find that, because of a variety of factors, their mobility levels may differ from the last time you skied together. Understanding the skier's mobility and strength levels is essential to being able to work and adapt to his strength and experience the greatest success on snow.

ASD Assessment checklist	
What the individual likes?	
What the individual dislikes?	
What I should avoid?	
One support strategy I should definitely use?	
What is the individual's learning style?	
Does the skier use any particular learning tools or aids, tools for communication?	
How do the family / caregivers verbally communicate with the individual? What method? Type of language?	
Does the skier require the support of an educational assistant?	
Responds best to (male / female)?	
Are there any specific learning strategies that are being implemented at home / school?	
Are there any other tips / strategies that can be used to help manage behaviour or lower stress / anxiety?	
Does the skier have any physical movements / habits that indicate feelings of stress or anxiety?	
Does the skier have any sensory triggers or sensitivities the instructor should be aware of?	
Does the student have any gastrointestinal challenges? Have they missed a regular bowel movement recently? How has the student been sleeping?	
What other sports does the individual practice?	
How long can they stand / walk?	
Have they skied before?	
Does the skier have any previous injuries (concussions, sprains, strains, etc.) that would affect their ability to ski?	
How to get the individual's attention?	
Is the student capable of following multiple step directions?	
Does the student show signs of hyper reactivity or hypo-reactivity to sensory input	
How are the motor-planning skills of the student	
Does the student have low muscle tone?	
Do they toe-walk?	
Is the student well balanced while moving around?	
While standing and moving, do they keep their body in balance?	

Teaching Technique:

We are following the CSIA teaching progression and methodology when appropriate and relevant for students with autism. However allowances will have to be considered and applied to handle communication difficulties.

Skiing can be analyzed and developed using a set of 5 fundamental skills:

- Stance and Balance (centered mobile stance)
- Pivoting (steering with the lower body)
- Edging (balancing on the edges)
- Pressure Control (skier's ability to load and unload the skis by balancing against turning forces and/or using muscular efforts)
- Timing and Coordination (timing of the turn and coordination of the movements)

These skills exist for all skier types and determine the success of any skier in a given situation. As a teaching and coaching tool, skill development is used to assess performance, to prioritize student needs and to develop strategies for improvement.

Skiing can be assessed using the 3 basic competencies –

- Centered and Mobile Stance (Is your student centered and mobile or are they stiff, rigid, unstable, too far forward or too far back?)
- Turning with the lower body (Does the lower body lead the turning effort? Or do the hips or shoulders twist in the direction the student wants to turn?)
- Balance on the edges (Is the student able to grip the snow, does the student lack the ability to control turn-shape and speed control?)

Use the competencies as an assessment tool, and then look to develop skiing skills that are needed to achieve the competency that needs attention.

Factors that can influence your teaching decisions include:

- Assessment of your student (communication factors, overall fitness, confidence, fatigue and equipment),
- Consideration of the environment :
  - Terrain (know your terrain and use it well),
  - Light (brightness)
  - Noise (other skiers, skidoo, snow guns, lift, etc.)
  - Outside temperature
  - Wind factor

- Choice of development tactics (prioritize which basic skill(s) can best achieve the desired objective or competency),
- Evaluation of progress (tangible results achieved by the student),
- Guided mileage for skill development (consolidates progress and builds skier confidence).

Additional Teaching Strategies

Sometimes you give a great, clear instruction, but the participant does not do the skill. Here are some options to add after the initial instruction, if needed. Do not just repeat yourself!

Technique: Modeling

Works well if	Tips	Does NOT work if.	Tips
The participant will watch your demonstration. The participant is able to copy the skill after you demonstrate it.	Get the participant's attention before modelling. Have a volunteer or peer model while you point out the key components of the skill.	The participant looks or runs away as you are demonstrating the skill. The participant does not yet have the motor ability to copy the skill.	Refer to what the family-member / caregiver is using to get the student's attention. Progress by doing simple drills that will benefit basic motor ability: agility, coordination, balance, limp speed, hand-eye and foot-eye coordination.

Technique: Physical guidance

Works well if	Tips	Does NOT work if.	Tips
You are physically able to guide the participant into the correct movement. The participant is ok with guiding touch.	Move slowly and with respect. Use a low voice tone. Let the participant know what you are doing/ask "I am going to help you put your hand in the right place, ok?"	You cannot physically guide the movement. The participant is very resistant to physical guidance.	Use modeling, verbal or video modeling. Ask someone who has a good link with the skier to physically guide the movement.

Technique: Video Modeling

Works well if	Tips	Does NOT work if.	Tips
You have access to an iPad/iPhone. You can quickly film a short video of someone performing the skill. The participant is interested in watching the video.	Keep it simple, short and clear.	The video does not hold the participant's attention.	Watch for what is holding the participant's attention.
You can think of a good cue to add (e.g., draw the course on the snow, add more 'targets' to aim at).	Be creative!	Visual cue presented does not get the attention of the student.	

Following you will find a six step-by-step guide. However, due to communication difficulties your student may present, the following steps should be considered as a best practices guide. You as an instructor may have to combine steps or change the order of these steps to maintain the attention / focus of your student. However safety is still paramount for every lesson.

Make goals realistic and aim for success. Talk to the individual or their parent / caregiver about what they are looking to achieve in each lesson. Be prepared that it may take considerable time for students to move through their goals and the progression. It may also be necessary to do a lot of repetition in order for a student to master a skill.

Step 1: Introduction to Equipment, including Communication, Routine and Steps

Goals

- **Suitable communication method introduced**
- **Develop familiarity with the equipment**
- **Create the first routine and steps with the student**
- **Establish a bond / connection between the instructor with the student**

Goals	Teaching Tips	Exercise
Introduce the communication methods you will be using.	Refer to your AOT about their receptive communication skills as well as their expressive skills. A conversation with parents or caregivers will help decide the most appropriate method for communication while out on the slopes. Talk less, listen and observe more. Avoid asking a Yes / No question. As you introduce the communication method, look for positive and negative reactions. A positive could be very little to no reaction up to a happy reaction or excitement. A negative reaction could be from little to no reaction leading to frustration, impatience, or verbal and/or physical activity at a later time. A reaction could also be prompted by something that they don't understand and will likely demonstrate as frustrations, echolalia, flapping hands, rocking back and forth, as well as some physical or verbal typical behaviours. Remember that your facial expression may not tell them at all what you want. Use something that is clear reference for them. Refers to what parents / caregivers told you about what the individual likes and dislikes.	A side-by-side approach when demonstrating is often easier for the student to comprehend. Show and say or Say and Show: Pair words with pictures, models, gestures, visual cues, text (lists, schedules, etc.) Use short, clear phrases ("Hands here" "Bend knees") Be specific and direct. Video modeling. Use of Board with picture / pictogram.
Introduce the equipment and allow the student to feel the equipment.	Introduction to equipment can start indoors and then progress to flat terrain on snow. Explain functional aspects and safety features. Tip: Gloves on when feeling edges of skis.	Show your student the boots and how the buckles work. Show your student the skis, warning of sharp edges. Show your student their bindings. Practice getting in and out of skis.
Allow the student to gain a good understanding of how the equipment works.	When introducing skis for the first time, keep the technical talk to a minimum. When the student goes from skidded turns to carved turns, then introduce ski technology.	As a general rule introduce in discuss equipment inside and then move outside. When outside, check the bottom of the ski boots and remove all excess snow before clicking into the bindings. You may have to kneel down and face the skier from the side and have the skier place a hand on your shoulder while assisting them when placing his boots into the bindings if they are unable to coordinate this movement.
Create a bond of trust, routine and steps with the student.	First time student are often nervous. The student may have no idea what to do – be directive, keep explanations clear and simple. Watch for motor skills problems as they could contribute to increased stress	Start with walking around with ski boots, indoor and outdoor (where it is less slippery). Use ski poles, and keep walking. You can already set a specific location at the base of the ski hill to get your skis and from there you put them on. That may quickly become a routine.

Step 2: Basic Mobility (flat terrain)

Goals

- **Develop mobility on flat terrain**
  - **Walking with ski boots**
  - **With skis on**
- **Develop skills - stance and balance, pivoting and edging**

Teaching Tips

- Keep using the same communication style that you established and worked best with the skier.
- Describe or draw each circuit you will be doing and present them one at the time.
- Remember that routines and patterns are important. Use the circuits in the same order as they may likely become part of your routine. However, NOT ALL individual with ASD require following a rigid routine. Thus refer to your AOT.
- Run through all of the movement patterns in the safe environment before moving to steeper terrain.
- The attention span / patience of your student will determine the amount of time you can spend at this step and all subsequent steps.
- First-time students often lean backwards putting them out of balance. If student is in the "back-seat" encourage student to feel their shin touching the front of the boot to help create a more centered stance.
- In the beginning use "toes and heels" instead of "tips and tails."
- If the skier can tolerate being touched, use hands to guide to promote good stance and balance.

Description	Stance & Balance	Pivoting	Edging
Walk around in boots.	X	X	
Talk about feeling the whole foot when walking around on the flats.	X		
Emphasize side step and walking around in circles. Look for an active "inside leg" steering even when walking around.	X	X	X
When moving around with skis on, promote small steps to keep mass over feet.	X	X	
With two skis on, walk and push around on the flats. Encourage students to keep poles outside their feet and hands held at hip height.	X	X	
Turn around on the spot: tips together then tails together. Emphasize rotating with the foot at the center to develop Pivoting skills.	X	X	
Introduce sidestepping and "herringbone" as a method of climbing up gentle slopes. TIP- If student has difficulty gripping the snow then encourage use of ankle and knee to develop edging skills.	X	X	X
Pole along to propel on the flats.	X		
Herringbone and sidestep to gain elevation.	X	X	X
Introduce the wedge position as a method to control speed and stop on gentle slopes. Use your student's hands as needed to show ski position. Instructor may ski backwards (and may hold hands) to guide student.		X	X

Step 3: Gliding and Stopping

Goals

- **Develop Stance and Balance skills while sliding**
- **To be able to stop on command using a wedge**
- **To be able to control speed through use of a gliding wedge**

Teaching Tips

- Choice of terrain is important. A gentle slope with a flat or slight uphill out run is ideal.
- Maintain close contact and a confident voice tone.
- Try to work in quiet areas away from noisy crowds.
- As the student becomes more comfortable, increase speed and length of the straight run.
- Review how equipment is fitting now that the student has spent some time in it.
- Hands forward will help keep the student out of the back seat. Emphasize ankle, knee and hip flex for the relaxed athletic stance that keeps one over the soles of their feet and in balance.
- Review wedge position from walking around drills. Use your student's hands as needed to show ski position.
- If wedge position is a difficult position to reach, it is suggested that skipping the wedge turn and going directly to a parallel turn may be a strategy worth trying.

Description	Stance & Balance	Pivoting	Edging
Use herringbone or sidestepping to walk up a gentle slope. When student is ready - have them slide down the slope with their skis straight. Encourage a mobile, athletic stance. Good terrain choice will allow the student to stop naturally without using a wedge.	X		X
Adopt a centered stance with proportional bending of all joints.	X		
Straight run to a natural stop.	X		
Once comfortable sliding in a straight run, encourage the use of the wedge to stop. Use static drills to "spread the snow" into wedge, then add to the straight run.	X	X	X
Minimal slope for straight run and increased with braking wedge. Experiment with opening and closing the wedge and ask student to notice the difference in speed as the wedge is opened.	X		
Ask student to hold a gliding wedge in which the speed is controlled - not increasing or decreasing	X	X	X

Step 4: Individual turns

Goals

- **Learn to turn left.**
- **Learn to turn right.**
- **Develop pivoting and edging skills.**
- **Continue to develop stance and balance skills.**
- **Introduction to linked turns.**

Teaching Tips

- Do not rush to move to different terrain or to the chairlift until the student can comfortably make turns, link them and stop. The same terrain that has been used for the straight run will be used for introducing turning.
- Be aware of the size of your students wedge when introducing turning:
  - If far too small, your student may have difficulty with speed control and balance, and may lack the natural edge angle created by having the skis in the wedge.
  - If far too big, the student may have difficulty pivoting and can result in the edges "locking" in the snow.
- Adapt the pace of your lesson to the ability of your student. Most students will need to stay in a wedge to learn how to turn; however, if you have a very confident and athletic student, then you may be able to teach student to link turns or even to turn in parallel straight away.

Description	Stance & Balance	Pivoting	Edging
From a straight run in a gliding wedge, introduce a slight direction change.	X		
Ask the student to maintain the wedge but point it in the direction you ask.			
Try following me, drill			
Repeat in both directions.	X	X	X
Gradually get student to turn more and achieve a rounder turn in the each direction.			
This can be achieved through stronger pivoting skills and through balancing on the outside ski (i.e. balancing on the left ski when turning right and balancing on the right ski when turning left).	X	X	X
Fan progression - allow the VI skier to become comfortable with turning uphill to slow down and stop. Repeat on both sides.	X	X	X
Garlands - focus on either repetitive linked turn initiations or repetitive linked finishing the turns. Repeat on both sides.	X	X	X
Use tactics / drills as needed to achieve a controlled turn. For Example: Airplane turns can be used to correct "tipping" onto the inside ski and to achieve better balance on the outside ski.			
In a wedge, a natural edge angle is created; the pivoting technique is the skill you need to develop.			

Description	Stance & Balance	Pivoting	Edging
If your student is turning and pivoting the skis well in a wedge, but the ski is not gripping in the snow and there is no change of direction - check that the boots are tight enough (if too loose, there will be no natural edge angle). If boots are tight enough and there is still no change in direction, then ask student to put their weight more on the inside of the foot so that the ski tips and creates the slight edge angle needed to turn the ski. Repeat on both sides.	X	X	X
Ask the student to follow your tracks in a gliding wedge.	X	X	X
Through visual and verbal cues or in combination with a sensitive (hands on) cue, demonstrate how leaning forward and looking downhill starts a turn with the skis moving towards the fall line, and how returning to neutral position helps end a turn with the skis moving across the fall line.	X		
Introduce turn linking. Encourage the skier to release the grip from the outside ski and to centre their weight in the transition between turns and then, to turn their toes/legs in the new direction. Use any drills/ tactics that help to re-center the skier in the transition such as small hops or bouncing.	X	X	X

Step 5: Linking Turns

Goals

- **Link turns**
- **Introduction to speed control using parallel turn**
- **Develop all 5 skiing skills.**

Teaching Tips

- Use appropriate communicating methods at all times.
- When introducing a new skill, choose terrain for success.
- A smooth and round turn-shape will set your student up for success.

Description	Stance & Balance	Pivoting	Edging
Following from success of individual turns in each direction, have the student link turns by simply giving a verbal cue to start pointing the skis in the opposite direction before they come to a stop. If following is working, have the student try to follow in your tracks as you link two turns.	X	X	
Encourage student to release the grip from the outside ski and to centre their weight in the transition between turns and then, to turn their toes/legs in the new direction. Use any drills/ tactics that help to re-center the skier in the transition such as small hops or bouncing.	X	X	X
Use drills / tactics to develop stronger balance on the outside ski.	X		
Create edge angles with feet, knees, and hips.	X	X	X
Promote the turn in the hip socket. Illustrate by having the skier lift one leg and then turn their leg and foot to the right or left and ask them to feel the leg turning in the socket. We then steer our legs in the direction we want to go.		X	

Description	Stance & Balance	Pivoting	Edging
Demonstrate how to bring skis parallel at the turn completion by letting the inside ski fall close to the outside ski.	X	X	
Demonstrate to the individual how to put their skis parallel while gliding in a straight line.	X	X	
Explain and show how turn-shape can control speed rather than the size of the wedge. Using a J shaped turn in each direction (holding the turn until you stop) show the skier how speed is controlled. Use strong directional commands to help the skier turn the correct amount.	X	X	X
Balancing on the outside ski and the inside ski is a result of speed and balance which determines when the skis are parallel.	X	X	X
Skating on the flats, push using poles.	X	X	X

Step 6: Turn progression and Beyond

Goals:

- **Intro to parallel turns**
- **Full Parallel turns (using various speed, turn shape, terrain and balance)**
- **Explore new terrain**
- **Introduce pole-plant**
- **Continue to develop all 5 skiing skills**
- **Experiment with changing the turn-radius (short and long turns)**

Teaching Tips

- Assess terrain and snow conditions when planning the lesson. Look for ways to ensure success, while challenging the skier.
- When introducing parallel skis – faster speed on flatter terrain is more successful than slower speed on steeper terrain.
- Be aware of the dynamic balance ability of the skier and adjust your lesson as needed.
- Use appropriate communicating methods at all times.
- Assess your student using the basic competencies and then, choose a skill to develop to achieve the desired competency.
- A smooth, round and un-rushed turn-shape will set your student up for success

Progression Steps

Description	Stance & Balance	Pivoting	Edging
Demonstrate to your student to match skis into parallel at the end of the turn by sliding the uphill / inside ski towards the downhill / outside ski so that your skis match	X	X	
Demonstrate to your student to match skis during the fall line	X	X	
Explain and show how turn-shape can control speed rather than just using the size of the wedge. Using a J shaped turn in each direction (holding the turn until you stop) to show the skier how speed is controlled. Use strong directional commands to help student turn the correct amount.	X	X	X
Balancing on the outside ski and the inside ski is a result of speed and balance which determines when the skis are parallel.	X	X	X
Use drills / tactics to develop stronger and earlier balance on the outside ski. Experiment with lifting the inside ski. The result should be that both skis are parallel above the fall line.	X	X	X
If inside ski hangs up or a step is needed to match skis, promote inside ski tip and knee lead into the turn. A smooth, round turn shape will also help.	X	X	X
Encourage simultaneous edge change in-between turns. Side-slipping and hockey stops are good drills to develop the edging skills that are needed for parallel turns.	X	X	X
Garlands can be used as needed to focus on either turn initiation or turn completion.	X	X	X
Introduce a pole-plant to help with timing and co-ordination of movements.			
Parallel turns may start as skidded turns but gradually work with edging to develop steered and carved turns.	X	X	X
Experiment with different turn-shapes and terrain as student's skills develop. Aim to challenge student while ensuring success. Short turns, long turns, rhythm changes, steeper terrain, uneven terrain, etc.	X	X	X

Here is a proposed checklist that you can use to follow your skier progression:

Progression Checklist	No	Partially Able	Yes
Centered mobile stance at all times: Is the student centered and mobile at all times?			
Steering coming from the legs: Does the lower body lead the steering effort?			
Balance: Can the student balanced on their edges?			
Focus on the timing and coordination of movements to carry momentum from one turn to the next. Is there a smooth transition between the turns?			
Steering / pivoting: Is the steering smooth and continuous throughout the turn?			
Different turn shapes: Is the student able to change the turn radius?			
Speed control: Is the student able to stop by turning across the fall line on both sides?			

Lift Procedures:

- Before riding a lift with a student with autism it may be necessary to clearly explain the procedures and expectations. Provide the student with information about the lift before getting on it. To convey this information, the instructor may include pictures, photos, diagrams, social scripts etc. in their explanation. It may be useful to give as much information as possible, depending on the student's developmental and communication abilities. You could also simulate loading on a bench or chair.
- Clearly define the types of behaviours that are expected when riding a lift. Remember there are many steps involved in riding a lift. Use clear and simple language, and a communication method that is appropriate for the student. It may be necessary to repeat the rules for riding a lift regularly. Some examples:
  - "When we wait in line we keep our hands to ourselves"
  - "When we ride the chairlift, we will keep our buttock on the seat and try to sit still."
  - "Stay on the chairlift until the instructor tells you it is time to get off."
- Give Clear Guidelines (be directive)
- Safety on lifts
- People with autism, in particular children, may not have a strong awareness of safety concerns. It is important to be aware of and ensure the physical safety of the individual at all times. This may involve using a harness, tether or physical support to ensure the individual remains on the lift.

Lifts... Reassuring the Individual

Be aware that riding a lift may produce anxiety in some individuals with autism. Try to prepare the student thoroughly in a meaningful and understandable manner. The child may require a slow and thoughtful step-by-step process before actually riding a lift.

For example:

1. Explanation of the lift and pictures shown.
   a. Look at the lift from a distance.
   b. Look at the lift up close.
   c. Watch and explain how people load the lift.
      i. Explain all steps: walk through maze.
      ii. Instructor may carry the student's poles, if used.
      iii. Wait until the lift operator indicates we can walk again
      iv. Walk up to a specific line (be precise and clearly indicate where to stop walking)
      v. Indicate when to sit on the chair (be directive; countdown 3-2-1-sit)
      vi. Wait until the instructor tells to put the safety bar down
      vii. Watch for your legs and ski boots
      viii. Put your skis onto the rest foot bar
   d. Explain what you expect in terms of behaviour on the chairlift.
   e. Explain what will happen at the top:
      i. Get both feet off the rest bar
      ii. Raise the safety bar
      iii. Indicate when to stand up (be directive)
      iv. Indicate where to go (be directive)
         1. Slide and stop when I say "STOP" (use the established communication methods that work best).
         2. Straight run, then turn left and then stop.
         3. Be directive.
2. Next step is to perform the drill getting on the lift following the above explanations
   a. Stand in line but do not get on the lift.
   b. Get on the lift.
      i. For the first few rides, Ask the chairlift operator to slow the lift if required.
   c. Tell the student the number of pylons/towers will be passed before arriving at the top of the lift.
   d. Get off the lift.
      i. From top, move away from the crowd.
      ii. From this point on, tell your student what will happen: e.g. we will ski down this slope, it is called XYZ. First we will do XYZ turns and then we will stop. Follow me
3. Tell your student how many times you will be using the chairlift before going inside the lodge for a break. Usually, three is a good number. This might likely become part of the routine.

Safety Recommendations:

- It is strongly recommended that all individual wear a helmet to promote safety in the event of a fall or striking or being struck by the skiing public.
- It is strongly recommended that individual should also wear eye protection.

9.6 - Cognitive and Intellectual Disabilities

Overview:

Defining cognitive disability is not easy, and definitions of cognitive disability are usually very broad. Persons with cognitive disabilities may have difficulty with various types of mental tasks. Intellectual disabilities, also known as developmental delay, are a group of disorders defined by diminished cognitive and adaptive development.

Students with either Cognitive or Intellectual Disabilities (IDs) fall under a range of disabilities including but not limited to: Down Syndrome, Fragile X Syndrome, Autism, Traumatic Brain Injuries and Learning Disabilities. Many cognitive disabilities have a base in physiological or biological processes within the individual, and other cognitive disabilities may be based in the structure of the person's brain. Persons with more profound cognitive disabilities often need assistance with aspects of daily living activities while a person with minor learning disabilities might be able to function adequately despite their disability.

Each disability has unique differences just as every student with a cognitive or intellectual disability presents with unique challenges and strengths. However there are also similarities in how to approach teaching a person with an IDs to winter snow sports.

While there can be components of physical disability including some motor skills (coordination, agility and muscle tone considerations), overcoming communication challenges between you and your student is the overriding Focus.

People with limited cognitive abilities can struggle to develop the skills needed for independent living. Without these skills, it is hard to live in a safe and socially responsible manner. Children with IDs usually develop more slowly than their peers. They usually sit, walk, and talk much later than other children. This delayed development means they do not act their age. Limited cognitive capacity makes learning more or very difficult. Therefore, learning new information and skills is challenging. As such, the learning curve proceeds more slowly. It is also difficult to apply information in a practical and functional manner. People with IDs may have trouble grasping complex and abstract concepts. This may affect their ability to develop important social skills (because social skills are complex and abstract).

Down Syndrome:

Down Syndrome refers to a type of cognitive delay in general intellectual functioning that may include deficits in adaptive behaviour, motor coordination, muscle tone as well as cardiac, digestive, vision and hearing impairments. Down Syndrome is the most common genetic origin of IDs and is caused by an extra chromosome and called Trisomy 21.

Individuals with Down Syndrome characteristically have loose joints with accompanying low muscle tone referred to as hypo-tonicity. They may also have cardiac and respiratory conditions that may impede their endurance and overall heath. Atlanto-axial instability (two first cervical spine bones) which is a congenital defect at the top of the spine can be present in children with down syndrome that would prevent their participation in sports including skiing and snowboarding and should have a cervical spinal x-ray and permission from a medical professional before participating.

Down Syndrome commonly results in an effect on learning style, although the differences are highly variable, just as physical characteristics or health concerns.

Fragile X Syndrome

Fragile X Syndrome is the second leading genetic cause of intellectual disabilities (most common genetic cause of intellectual disabilities in males). People can be carriers of Fragile X without any symptoms. In other words, family members may have excessive repeats of the gene. However, the repeats are not enough to cause IDs. Fewer repeats mean fewer problems.

There are several physical features of Fragile X. The face is elongated and the ears are large. The forehead tends to be larger than normal. The jaw has a pronounced shape. People with Fragile X are generally large in stature, but with poor muscle tone.

Behavioural features include a reluctance to make eye contact. Individuals with Fragile X may engage in odd, stereotyped movements, hyperactivity, tremors, and poor motor coordination. Moreover, their social and communication skills are not well developed. Similar behavioural symptoms are characteristic of Autism Spectrum Disorder (ASD). People can receive a diagnosis of both IDs and ASD.

There are three subtypes of Fragile X. Here we present the first two as they will have a significant impact on the teaching aspect and in the ability of the individual to perform the task. The first presents cognitive deficits which are more severe and share many symptoms of ASD:

- ✔ social avoidance,
- ✔ repetitive movements,
- ✔ severe delays in developing speech and language.

The second type of Fragile X affects motor skills (sense of balance) and presents tremors and memory deficits.

Autism Spectrum Disorder

A leading cause of intellectual disabilities is ASD. A person may be diagnosed with both ASD and IDs. People with ASD may have trouble with communication and social interaction. They may also demonstrate repetitive patterns of behaviours, interests, or activities. Some examples are repetitive speech, ritualized patterns of behaviour, or fixation upon certain objects. Thus, while ASD and IDs share some similarities, they are not the same. For more information on ASD, refer to the ASD chapter.

Severity Codes

Both the American Psychiatric Association (APA) and The American Association on Intellectual and Developmental Disabilities (AAIDD) use severity codes to refine diagnosis and categorize IDs. Severity is assessed across three domains (1-conceptual, 2-social, 3-practical life skill) and falls into one of the four severity categories: mild, moderate, severe and profound.

Category	% Efficacy in the 3 domains	Description
Mild	85	• Many individuals within this group can achieve some academic success; • Usually meet elementary academic levels or beyond with sufficient supports; • Are mostly self-sufficient; • Can live independently within their communities with a minimal level of additional supports (i.e. assistance with life decisions, finances, nutrition, shopping, and transportation).
Moderate	10	• People in this range have adequate communication skills but complexity is more limited; • Social cues, social judgment, and social decisions (particularly romantic decisions) regularly need support; • Most self-care activities can be performed but may require extended instruction and support; • Independent employment can be achieved in positions that require limited conceptual or social skills. However, additional supports may be required; • Independent living may be achieved with moderate supports such as those available in group homes.
Severe	3-4	• Communication skills are very basic; • Self-care activities require daily assistance; • Many individuals in this category will require safety supervision and supportive assistance; • Residence in supported housing is usually necessary.
Profound	1-2	• Dependent upon others for all aspects of daily care, Usually 24-hour care and support are needed; • Communication skills are quite limited; • Usually have co-occurring sensory or physical limitations.

Learning Disabilities:

Learning Disabilities refer to a number of disorders that may affect the acquisition, organization, retention, understanding or use of verbal or nonverbal information. These disorders affect learning in individuals who otherwise demonstrate at least average abilities essential for thinking and/or reasoning.

Learning disabilities are due to genetic and/or neurobiological factors or injury that alters brain functioning in a manner which affects one or more processes related to learning and is lifelong. The way in which they are expressed may vary over an individual's lifetime, depending on the interaction between the demands of the environment and the individual's strengths and needs.

Brain Injury

There are a number of causes of brain injury, including Stroke, illness, Traumatic Brain Injury (TBI), brain tumors, and Meningitis, among others. Each brain injury is unique - there is no reliable way to predict how an individual's brain will be affected by a particular injury. The extent of the injury to the person's brain determines the outcome of the person's ability to process information.

An injury to the central nervous system produces numerous motor impairments, ranging from focal paralysis of one or a few muscles to generalised difficulties in planning and co-ordinating complex movements.

Lesions to the main line of the motor system may result in an enhancement of some features (positive features or exaggerated response) or a reduction (negative features).

Positive features or **exaggerated response** can include: Hyperreflexia and hyper-tonus (abnormal resistance to passive movement).

Negative features can include: Loss of strength, Loss of dexterity, Fatigability.

Brain Stem System may lead to: dyscontrol of automatic behaviours, such as posture, balance, locomotion and breathing.

Motor Areas of the Cerebral Cortex may cause: weakness - hyperreflexia - spasticity. The motor cortex plays an important role in organising, shaping and refining movement.

Cerebellum lesions may lead to: poor planning of movement - poor regulation and timing of movement - reduced smoothness and co-ordination of movement.

Other areas of the brain may also be altered and would lead to multiple characteristics: hypertonicity or hypotonicity, poor postural control or loss of voluntary control, slowing of movement, poor co-ordination, poor implementation of motor plans, focal weakness, loss of sensation, etc.

We strongly suggest assessing possible motor deficits and cognitive understanding in Individuals with brain injuries.

Common difficulties

Frustration Tolerance: A related difficulty is poor frustration tolerance. When an impulse is inhibited, it requires the ability to tolerate a bit of frustration. This ability is called frustration tolerance. Frustration tolerance is an important developmental skill. It allows people to comfortably endure the small frustrations of everyday life. This in turn serves to limit the unpleasant consequences associated with impulsive behaviour. Frustration tolerance also enables people to build confidence. People respond to frustration in different ways. Some people respond in an impulsive, stubborn, and aggressive manner. Others respond with passivity, withdrawal, and compliance. Poor frustration tolerance may cause aggression toward caregivers. It may also lead to self-injurious behaviours. These behaviours are observed in some people with cognitive impairments.

Self-Esteem: Another common difficulty is low self-esteem. Self-esteem naturally develops as children learn to solve problems. The ability to solve problems builds self-confidence. However, limited intellectual functioning makes it difficult to solve problems and is associated with little perseveration and attention skills.

Social Skills: A related difficulty is the slower development of social skills. This becomes evident when children play together. Individuals with IDs struggle to understand and heed social rules and customs. Some common examples are taking turns and waiting in line. IDs are mostly undetected until a child starts school. Education challenges children to develop and expand their cognitive, social, and emotional skills. Children with IDs cannot easily meet these challenges. It is hard for them to learn new information as quickly as other children do.

Hyperactive and Hypoactive

Some individuals with intellectual disabilities have difficulty interpreting, integrating, and coordinating sensory input. Sensory integration activities help these individuals strengthen these abilities.

Hyperactive (overactive) Systems: These individuals have difficulty blocking out signals that should be ignored and in response to this overactive system, they avoid motion activities like climbing stairs, are prone to motion sickness and may seek support from others while walking.

Hypoactive (underactive) Systems: These individuals have difficulty attending to signals that should be heeded, may actively seek out motion and may enjoy swinging and climbing activities without becoming dizzy after spinning.

Sensory integration activities (like snow sports) address individual's sensory needs by either lessening or amplifying the intensity of the sensory stimulation they receive. Most sensory integration activities work with individual's vestibular, proprioceptive, and tactile sensory systems.

The vestibular sensory system enables us to stand, coordinate movement and involves sensory input from vision and from sensory organs in the inner ear. Activities that stimulate the vestibular system involve movement like swinging, jumping, and spinning. The proprioceptive sensory system provides information about the body's positioning. Proprioceptive feedback helps coordinate gross and fine motor skills.

Assessment of Abilities

Gross Motor Skills (GMS) in people with IDs can range from a level of normal functioning to important physical disability. When a person with IDs has GMS impairment, one result is increased difficulty accessing learning opportunities.

Because ski teaching techniques and progression are chosen and planned for an individual's specific needs, it is fundamental to know what their capabilities are. The best way to find out is to ask questions regarding their intellectual abilities, what they understand as concept in general but more precisely concepts that are essential to skiing and snowboarding. Following these questions, their mobility, balance, coordination and strength will be observed in order to see how their body can move and achieve movements needed to perform skiing or snowboarding. While doing so, observe if they do what you asked them to do.

Understanding the skier's mobility and strength level is essential in working with and adapting to these capabilities.

The focus is on Stance and Balance, Pivoting and Edging:

1. How the skier can best maintain a centered mobile stance,
2. Pivoting, how the skier can get their skis /feet /legs (lower body) to change direction, and
3. Edging, how the skier can best move laterally while staying balanced to enable the ski to edge on the snow.

Essentially, it goes back to the CSIA's basic skier technical references competencies: centered mobile stance, steering with the lower body if possible and balancing on your edges.

Each instructor must have gone through the Student Medical Sheet (Appendix 6) prior beginning the AOT process.

Ask

Being aware of an individual's specific disability, an adaptive ski instructor needs to focus on the student's potential while recognizing challenges, and where they originate from.

NOTE: When asking questions, it is recommended to first ask the participant to help gauge understanding and self-awareness. If the individual is unable to give the answers that are required, then engage a parent or guardian to assist. It is also important to remember that an individual with an ID may be able to communicate well and answer questions but may have an over exaggerated, or undervalued sense of self, so questions will need to be supported with observations and testing.

Ask	Look for
Does the individual has Down Syndrome? Atlanto-Axial (cervical Instability) ?	If the answer is yes, skiing should not be performed. If unknown, ask for medical permission prior any test on snow.
What other sports does the individual participate in?	Sports that require balance, strength and mobility and some motor skills ability so it could be transferred into skiing.
Does the person think of themselves as fit and active? If so, why?	The ability to correctly self-evaluate.
Have they used any other specialized adaptive sports equipment?	Sports that could be related to skiing as well as adaptive equipment.
How long can they stand / walk without support?	Gauging their endurance level will guide how you will pace the lesson.
Where do they think their strengths are?	Perseverance, participation in other sports, positive attitude, determination.
What are the common challenges the individual face?	Limited movement, fatigue, balance, coordination, lack of belief in themselves and /or their abilities, frustration, social skills, etc. Fatigue Chart can be found in Appendix 10. Check their ability to understand concept and simultaneously try to evaluate the severity level of their condition (mild, moderate, severe or profound).
How did the individual overcome these challenges?	Creativity with answers and perseverance.
Do they participate in a physiotherapy or a kinesiology treatment program?	Reason they have treatment.
What happens if they are unable to overcome a challenge?	Look for frustration tolerance, impulsivity or aggressive behaviour response pattern. If there is a history of aggressive behaviour, be clear with the individual that it will not be tolerated in this environment.
How is their self-esteem?	Low perception of their ability
How are their social skills?	Difficulties to understand social rules and customs.
Does the individual have hypoactivity or hyperactivity?	Difficulty interpreting, integrating, and coordinating sensory input Hyper: difficulty blocking out signals Hypo: difficulty attending to signals
How has the individual found they learn best? Verbal command (complex or easy), visual demonstration, Hands on, imitation?	By finding out the individual's strength in learning and following directions It will help you to structure your ski lesson accordingly and control how the information is given.

Observe

Examine the individual as they walk and move around. As you do this, relate the ease of the movements to skiing. Also with an individual with an ID, observe their ability to follow directions, whether that is with their family, peers or other directional cues such as observing and obeying signs. This will help gauge abilities to follow directions and safety aspects on hill that will be so important to a positive experience on snow.

Observe	Look for	Relate to skiing
Is the student well-balanced while moving around?	Unsteadiness, lack of balance, lack of confidence.	The more unsteady the individual is, the more reliant he will be on skiing aids for support, balance and turning.
Is the student looking for additional support to assist movements?	Uses of chair, walking aid, wall or person.	
Is one side of the body stronger and / or moves easier than the other?	Weakness originates from the legs, trunk or upper body or a combination of the above.	Weakness on one side will affect the turning ability, making one turn more difficult. Weakness on the core muscles will affect lateral, fore and aft balance. Weakness on the upper segment of the body (core or arms) may affect the ability to stabilize the upper body.
Does the student have mobility in the joints?	Flexion Rotation Pronation	Greater mobility of the joints will facilitate a better center mobile stance.
How is the student's gait?	Alignment of feet, point out/ in, The alignment originates from spine, hips, knees or ankles.	If the foot is pointing out, it may indicate the need for the use of a ski bra to promote the ski tips working together. If the feet are pointing in, the wedge turn will be easier but parallel skiing more difficult.
Eye contact	Ability to make eye contact	When you explain a task, they may show reluctance to look at you. Make sure they understand and do not insist on being looked at. It is important to find out their signs of understanding of directions and tasks, so you can be aware of this during the lesson.
Is the student limping?	Weakness or restricted mobility on one side Legs are different lengths	A weakness on one side will affect the turning ability making one turn more difficult. A weakness in the core muscles will affect lateral, fore and aft balance. If one leg is shorter, try to consult a certified ski technician for a potential solution. This will enable the skier to maintain a more balanced position on his/her skis.
While standing and moving, does he keep his body above his feet?	Leaning fore/aft or laterally	This will have a direct impact on the skier's ability to maintain a centered mobile stance.
Are movement patterns quick or slow?	Quick movement patterns Slow movement patterns	The quicker the movements, the greater the confidence. This can have an effect on lesson pacing as someone that is more steady and mobile will find balancing on a ski easier and therefore, would learn more quickly.
While moving around, does the individual display an ability to separate movements between upper and lower body?	Uses the upper body to assist the movement of the lower body.	The more ability the skier has to separate the lower and upper body, the more you would promote the steering effort coming from the lower joints and vice versa.

Test

Here are six proposed mobility and strength tests relating to movements and levels of strength that will be required for skiing. While performing the testing section, we have a great chance to continue observing, which will lead to an understanding of the individual's ability to follow direction, process information, and learn. For example, when explaining how to do a test, can the individual process and follow the verbal direction? Do they have to be shown, and/or copy you doing it? Do you have to be more hands on in your direction? Do you have to explain and break down the tests into smaller more easily achievable parts? By recognizing the above observations, you will be learning about how you can deliver information and directions during the lesson to best set up the student for success, all while actually testing their physical abilities for skiing and snowboarding.

Test	Look for	Relate to skiing
Balance and Endurance	Perform a static balance test eyes open. Is the skier losing balance due to leaning or moving laterally or from a fore and aft movement, or due to instability in the core? When the skier moves around, do you see a decrease of the ability to flex or weakness on one side or the other?	The balance test is performed by maintaining balance on one foot, both arms at the waist for maximum of 60 sec. The longer they can perform this, the better the balance. The more instability due to balance, the more reliant the skier will be on skiing aids for support balance and endurance. If a weakness appears after a certain period of time, deterioration may be observed of the ability to perform certain manoeuvres correctly. It is possible in individuals with brain injuries to show aggressive behaviour when fatigue sets in. This type of reaction often comes before the person expresses that they need to rest.
	After the test, ask the skier to evaluate fatigue level using the Fatigue Chart (Appendix 10).	During the test, rapid reports of fatigue will directly impact on the relation between resting periods and reliance on skiing aids for support.
Flexion and Extension	While checking range of vertical movement, focusing on the ability to flex and extend the ankle, knee and hip. Determine if balance is maintained.	This will indicate the ability to maintain a centered mobile stance. The greater the ability to do this while maintaining balance, the less reliant on skiing aids. The range of movement will also indicate the ability to control pressure at more advanced stages of ski progression.
Lateral movement	Check range of movement when rolling knee side to side and determine if balance is maintained.	This will indicate the ability to edge a ski and maintain balance while doing so.
Pivot	Ability to rotate the foot and the leg across the body while keeping the upper body still. Upper and lower-body separation. While performing test, observe if the hip and upper body rotate to assist the movement.	This will indicate the ease of the individual to steer with the lower body. The range of mobility the individual demonstrates with this test will indicate the potential to execute pivot while skiing.
Wedge Turn	Ability to make a wedge turn	The ability to make a wedge turn is not essential to progress, but if unable to move in this way, then you will obviously try to include it in your progression. If not, then move on to turning to stop.
Agility	Have the individual walk or jog in a circle (4 meters diameter) in both directions.	Examine how the individual can naturally maintains and achieves the change in direction. By identifying the joints that are leading the change of direction, you have also indetify the joints to use for teaching.
Strength	Low muscle tone	Individual showing hypotonicity are likely to become tired.
Motor Coordination	When performing the walk or jog in circle, look for poor motor coordination. You may vary the radius and the speed.	If that is the case, make either quick or large turn and determine which one allows the skier to perform the task with the best coordination.

Do frequent mobility checks even with skiers with whom you have skied before. You can find that, because of a variety of factors, their mobility levels may differ from the last time you skied together. Understanding the skier's mobility and strength levels is essential to being able to work and adapt to his/her strength and experience the greatest success on snow.

Teaching Methods:

Individuals with intellectual disabilities benefit from the same teaching strategies used to teach people with other learning challenges. One such strategy is to break down learning tasks into small steps. Each learning task is introduced, one step at a time. This avoids overwhelming the student. Once the student has mastered one step, the next step is introduced. This is a progressive, step-wise, learning approach. It is characteristic of many learning models. The only difference is the number and size of the sequential steps.

Another strategy is to modify the teaching approach. Lengthy verbal directions and abstract explanations are ineffective teaching methods for most audiences. Most people are kinesthetic learners. This means they learn best by performing a task "hands-on." A hands-on approach is particularly helpful for students with ID. They learn best when information is concrete and observed.

People with ID do best in learning environments where visual aids are used. This might include charts, pictures, and graphs. These visual tools are also useful for helping students to understand what behaviours are expected of them. For instance, using charts to map students' progress is very effective. Charts can also be used as a means of providing positive reinforcement for appropriate, on-task behaviour.

The best teaching strategy is to provide direct and immediate feedback. Individuals with ID require immediate feedback. This enables them to make a connection between their behaviour and the teacher's response. A delay in providing feedback makes it difficult to form connection between cause and effect. As a result, the learning opportunity may be missed. This is linked to a learning method called Applied Behavioural Analysis (ABA). In its most basic form, ABA teaching technique rewards a person for making a correct choice. Incorrect choices are ignored, or not rewarded. Therefore, students learn by making simple associations between cause and effect. With repetition, a student learns to associate a correct action with a reward. As such, this correct choice will be repeated. Immediate rewards for correct behaviour is crucial to motivation. However, the reward must be valuable or desired. Each student will find different things rewarding. Only rewards that are intrinsically rewarding have a motivational effect. An example of a reward could be positive feedback, a high five, a treat, a play with a toy etc.

Factors that can influence your teaching decisions include:

- Assessment of your student (communication factors, learning style, overall fitness, confidence, fatigue and equipment available, severity and section of the brain altered if dealing with an individual with brain injury). Fatigue Chart can be found in Appendix 10.
- Consideration of terrain (know your terrain and use it well),
- Assessment of basic Skills (Is the student centered and mobile? Are they turning with the lower body? Are they balanced on their edges?),
- Choice of development tactics (prioritize which basic skill(s) can best achieve the desired objective or competency). Perform each task using micro-steps and reward immediately any success.
- Evaluation of progress (tangible results achieved by the student, terrain and skiing skills). Reward immediately any new success or achievement.

Tips for Students with Cognitive and Developmentally Delayed:

- Building a positive relationship with your student is a priority.
- The best teaching advice is to have short and clear instructions. Allow for possible delays in understanding / processing of instruction by your student.
- Use any kinesthesis approach to make it concreate and meaningful.
- Keep it simple and focus on one idea or concept at a time or for an entire lesson.
- Provide a positive attitude within your teaching at all times.
- Lots of positive feedback.
- Recognize and reward a positive step in learning no matter how small it may be.

In the following you will find a six step-by-step guide. However, due to the cognitive and communication factors your student may present, the following steps should be considered as guide. You as an instructor may have to combine steps or change the order of these steps, decrease or increase the lesson duration or sequence in micro steps to maintain the attention / focus of your student. However safety is still paramount for every lesson.

Teaching Techniques:

Taking these teaching methods into our snow world makes the process easier. As for the ski/snow techniques, we are following the CSIA/CASI teaching progression and methodology when appropriate and relevant for individuals with IDs. However allowances will have to be considered

and applied to handle communication deficiencies. No matter how physically capable your student with an ID is, this is still adaptive snowsports. The adaptations come from the instructor in how they present the information and the teaching environment they establish, to best set the student up for success.

Skiing can be analyzed and developed using a set of 5 fundamental skills:

- Stance and Balance
- Timing and Coordination
- Pivoting
- Edging
- Pressure Control

These skills exist for all skier types and determine the success of any skier in a given situation. As a teaching and coaching tool, skill development is used to assess performance, to prioritize student needs and to develop strategies for improvement.

Skiing can be assessed using the Technical Reference.

- Centered and Mobile Stance (Is your student centered and mobile or are they stiff, rigid, unstable, too far forward or too far back?)
- Turning with the lower body (Does the lower body lead the turning effort? Or do the hips or shoulders twist in the direction the student wants to turn?)
- Balance on the edges (Is the student able to grip the snow, does the student lack the ability to control turn-shape and speed control?)

Factors that can influence your teaching decisions include:

- Assessment of your student (communication factors, learning style, overall fitness and motor skill, confidence and self-esteem, fatigue and equipment). Fatigue chart can be found in Appendix 10.
- Consideration of the environment:
  - Terrain (know your terrain and use it well),
  - Light (brightness)
  - Noise (other skiers, skidoo, snow guns, lift, etc.)
  - Outside temperature
  - Wind factor
- Choice of development tactics (prioritize which basic skill(s) can best achieve the desired objective or competency),
- Evaluation of progress (tangible results achieved by the student, terrain and skiing skills),
- Guided mileage for skill development (consolidates progress and builds skier confidence).

Additional Teaching Strategies

Sometimes you give a great, clear instruction, but the participant does not do the drill. Here are some options to add after the initial instruction, if needed. Do not just repeat yourself!

Technique: Modeling

Works well if	Tips	Does NOT work if	Tips
The participant will watch your demonstration. The participant is able to copy the skill after you demonstrate it.	Get the participant's attention before modelling. Have a volunteer or peer model while you point out the key components of the skill.	The participant looks or runs away as you are demonstrating the skill. The participant does not yet have the motor ability to copy the skill.	Refer to what the family-member / caregiver is using to get the student's attention. Progress by doing simple drills that will benefit basic motor ability: agility, coordination, balance, limp speed, hand-eye and foot-eye coordination.

Technique: Physical Guidance

Works well if	Tips	Does NOT work if	Tips
You are physically able to guide the participant into the correct movement. The participant is ok with guiding touch. Note: Always ask permission to touch.	Move slowly and with respect. Speak clearly and at a pace the student can follow, use a lower voice tone. Let the participant know what you are doing/ask "I am going to help you put your hand in the right place, ok?"	You cannot physically guide the movement. The participant is very resistant to physical guidance.	Use modeling, verbal or video modeling. Ask someone who have a good link with the skier to physically guide the movement.

Technique: Video Modeling

Works well if	Tips	Does NOT work if	Tips
You have access to an iPad/iPhone/or any videoing device! You can quickly film a short video of someone performing the skill. The participant is interested in watching the video.	Keep it simple, short and clear.	The video does not hold the participant's attention.	Watch for what is holding the participant's attention.
You can think of a good cue to add (e.g., draw the course on the snow, add more 'targets' to aim at).	Be creative!	Visual cue presented do not get the attention of the student.	

In the following you will find a 6 step guide. However, due to communication difficulties your student may present, the following steps should be considered as a best practices guide. You as an instructor may have to combine steps or change the order of these steps to maintain the attention / focus of your student. However safety is still paramount for every lesson.

Make goals realistic and aim for success. Talk to the individual or their parent / caregiver about what they are looking to achieve in each lesson. Be prepared that it may take considerable time for student's to move through their goals and the progression. It may also be necessary to do a lot of repetition in order for a student to master a skill.

Step 1: Introduction to equipment, including communication, Routine and Steps

Goals:

- **Suitable communication method introduced**
- **Develop familiarity with the equipment**
- **Create the first routine and steps with the student**
- **Establish a bond / connection/ and expected roles between the instructor with the student**
- **Establish what is expected and appropriate Behaviour.**

Goals	Teaching Tips	Exercise
If using a communication method introduce it at the beginning.	Refer to your AOT about their receptive communication skills as well as their expressive skills. A conversation with parents or caregivers will help decide the most appropriate method for communication while out on the slopes. Talk less, listen and observe more. Avoid asking a Yes / No question. As you introduce the communication method, look for positive and negative reactions. A positive could be very little to no reaction up to a happy reaction or excitement. A negative reaction could be from little to no reaction leading to at a later time, frustration, impatience, physical and verbal reactivity, it could also be prompt to react to what they do not understand and could demonstrate frustrations, echolalia, flapping hands, rocking back and forth, as well as some physical or verbal typical behaviours.	A side-by-side approach when demonstrating is often easier for the student to comprehend. Show and say or Say and Show: Pair words with pictures, models, gestures, visual cues, text (lists, schedules, etc.) Use short, clear phrases ("Hands here" "Bend knees") Be specific and direct. Video modelling. Use of a board with picture / pictogram.
Introduce the equipment and allow the student to feel the equipment.	Introduction to equipment can start indoors and then progress to flat terrain on snow. Explain functional aspects and safety features. Tip: Gloves on when feeling edges of skis. Establish safety expectations, for example, Helmet and goggles must be warn when outside on snow.	Show your student the boots and how the buckles work. Show your student the skis, warning of sharp edges. Show your student their bindings. Practice getting in and out of skis. Reward verbally every bit of success.
Allow the student to gain a good understanding of how the equipment works.	When introducing skis for the first time, keep the technical talk to a minimum. Ask the student to explain to you what he is doing with the equipment and why.	Always perform it inside first then outside. When outside, check the bottom of the ski boots and remove all excess snow before clicking into the bindings. You may have to kneel down and face the skier from the side and have the skier place a hand on your shoulder while assisting him when placing his boots into the bindings if they are unable to coordinate this movement.
Create a bond of trust, routine and steps with the student.	First time skiers are often nervous. The student may have no idea what to do – be directive, keep explanations clear and simple. Watch for motor skills problems as they could contribute to increased stress.	Start with walking around with ski boots, indoor and outdoor (where it is less slippery). Use ski poles, and keep walking. You can already set a specific location at the base of the ski hill to get your skis and from there you put them on. That may quickly become a routine.

Step 2: Basic Mobility

Goals:

- **Develop mobility on flat terrain**
  - **Walking with ski boots**
  - **With skis on**
- **Develop skills - balance, pivoting and edging**

Teaching Tips

- Keep using the same communication style that works best.
- Describe or draw each circuit you will be doing and present it one at the time.
  - Remember to use them in the same order as they might likely become part of their routine.
- Run through all of the movement patterns in the safe environment before moving to steeper terrain.
- The attention span / patience of your student will determine the amount of time you can spend this step and all subsequent steps.
- First-time students often lean backwards putting them out of balance. If student is in the "back-seat" encourage student to feel their shin touching the front of the boot to help create a more centered stance.
- In the beginning use "toes and heels" instead of "tips and tails."
- If skier tolerates being touched, use hand guiding to promote good stance and balance.
- Do all you can to try and keep this fun and the student engaged, for example, small achievable steps, lots of positive reinforcement, game playing, copycat etc.

Description	Stance & Balance	Pivoting	Edging
Walk around in boots.	X	X	
Feel the whole foot when walking around on the flats.	X		
Emphasize for side step and for walking around in circles. Look for active "inside leg" steering even when walking around.	X	X	X
When moving around with skis on, promote small steps to keep mass over feet.	X	X	
With two skis on, walk and push around on the flats. Encourage students to keep poles outside their feet and hands held at hip height.	X	X	
Turn around on the spot: tips together then tails together. Emphasize rotating with the foot at the center to develop Pivoting skills.	X	X	
Introduce side-stepping and "herringbone" as a method of climbing up gentle slopes. TIP- If student has difficulty gripping the snow then encourage use of ankle and knee to develop edging skills.	X	X	X
Pole along to propel on the flats.	X		
Herringbone and sidestep to gain elevation.	X	X	X
Introduce the wedge position as a method to control speed and stop on gentle slopes. Use your student's hands as needed to show ski position.		X	X

Step 3: Gliding and Stopping : towards speed control

Goals:

- **Develop Balance skills while sliding**
- **Develop ability to stop using a wedge**
- **To be able to control speed through use of a gliding wedge**

Teaching Tips

- Choice of terrain is important. A gentle slope with a flat run out is ideal.
- Maintain close contact and a confident voice tone.
- Try to work in quiet areas away from noisy crowds.
- As the student becomes more comfortable, increase speed and length of the straight run.
- Review how equipment is fitting now that the student has spent some time in it.
- Hands forward will help keep the student out of the back seat. Emphasize ankle, knee and hip flex for the relaxed athletic stance that keeps one over the soles of their feet and in balance.
- Review wedge position from walking around drills. Use your student's hands as needed to show ski position.
- If wedge position is a difficult position to reach, it is suggested that skipping the wedge turn and going directly to a parallel turn may be a strategy worth trying.

Description	Stance & Balance	Pivoting	Edging
Use herringbone or side-stepping to walk up a gentle slope. When student is ready - have them slide down the slope with their skis straight. Encourage a mobile, athletic stance. Good terrain choice will allow the student to stop naturally without using a wedge. Adopt a centered stance with proportional bending of all joints.	X		
Straight run to a natural stop.	X		
Once comfortable sliding in a straight run, encourage the use of the wedge to stop. Use static drills to "spread the snow" into wedge, then add to the straight run.	X	X	X
Minimal for straight run and increased with braking wedge. Experiment with opening and closing the wedge and ask student to notice the difference in speed as the wedge is opened.	X		
Ask student to hold a gliding wedge in which the speed is controlled - not increasing or decreasing	X	X	X

Step 4: Individual Turns

Goals:

- **Simple left turn.**
- **Simple right turn.**
- **Develop pivoting and edging skills.**
- **Continue to develop balance skills.**
- **Introduction to link turns.**

Teaching Tips

- Do not rush to move to different terrain or to the chairlift until the student can comfortably make turns, link them and stop. The same terrain that has been used for the straight run will be used for introducing turning.
- Be aware of the size of your students wedge when introducing turning:
  - If far too small, your student may have difficulty with speed control, difficulty finding balance, and may lack the natural edge angle created by having the skis in the wedge.
  - If far too big, the student may have difficulty pivoting and can result in the edges "locking" in the snow.
- Adapt the pace of your lesson to the ability of your student. Most students will need to stay in a wedge to learn how to turn; however, if you have a very confident and athletic student, then you may be able to teach student to link turns or even to turn in parallel straight away.

Description	Stance & Balance	Pivoting	Edging
From a straight run in a gliding wedge, introduce a slight direction change. Ask the student to maintain the wedge but point it in the direction you ask. Try following me. Repeat in both directions.	X	X	X
Gradually get the student to turn more and achieve a rounder turn in the each direction. This can be achieved through stronger pivoting skills and through balancing on the outside ski (i.e. balancing on the left ski when turning right and balancing on the right ski when turning left).	X	X	X
Use tactics / drills as needed to achieve a controlled turn. Airplane turns can be used to correct "tipping" onto the inside ski and to achieve better balance on the outside ski.	X	X	X
In a wedge, a natural edge angle is created; the pivoting technique is the skill you need to develop. If your student is turning and pivoting the skis well in a wedge, but the ski is not gripping in the snow and there is no change of direction - check that the boots are tight enough (if too loose, there will be no natural edge angle). If boots are tight enough and there is still no change in direction, then ask student to put their weight more on the inside of the feet so that the ski tips create the slight edge angle needed to turn the ski. Repeat on both sides.	X	X	X
Ask the student to follow your tracks in a gliding wedge.	X	X	X

Step 5: Linking turns

Goals:

- **Link turns**
- **Introduction to speed control using parallel turn**
- **Develop all 5 skiing skills.**

Teaching Tips

- Use appropriate communicating methods at all times.
- When introducing a new skill, choose terrain for success.
- A smooth and round turn-shape will set your student up for success.

Description	Stance & Balance	Pivoting	Edging
Following from success of individual turns in each direction, have the student try to link turns by simply giving a verbal cue to start pointing the skis in the opposite direction before they come to a stop. If follow me is working, have the student try to follow in your tracks as you link two turns.	X	X	
Introduce linking turns. Encourage student to release the grip from the outside ski and to center their weight in the transition between turns and then, to turn their toes/legs in the new direction. Use any drills/tactics that help to re-center the skier in the transition such as small hops or bouncing.	X	X	X
Use drills / tactics to develop stronger balance on the outside ski. Create edge angles with foot, knee, and hip.	X	X	X

Step 6: Turn progression and Beyond

Goals:

- **Introduce skier to Parallel skis.**
- **Control speed using turn-shape rather than the use of the wedge.**
- **Full Parallel turns (using various speed, turn shape, terrain)**
- **Explore new terrain**
- **Introduce pole-plant**
- **Continue to develop skills**
- **Experiment with changing the turn-radius (short and long turns) and speed.**

Teaching Tips

- Assess terrain and snow conditions when planning the lesson. Look for ways to ensure success, while challenging the skier.
- When introducing parallel skis – faster speed on flatter terrain is more successful than slower speed on steeper terrain.
- Be aware of the dynamic balance ability of the skier and adjust your lesson as needed.
- Use appropriate communicating methods at all times.
- Assess your student using the basic competencies and then, choose a skill to develop to achieve the desired competency.
- A smooth, round and un-rushed turn-shape will set your student up for success.

Progression Steps

Description	Stance & Balance	Pivoting	Edging
Demonstrate to your student to match skis into parallel at the end of the turn.	X	X	
Demonstrate to your student to match skis during the fall line	X	X	
Explain and show how turn-shape can control speed rather than the size of the wedge. Using a J-shaped turn in each direction (holding the turn until you stop) show the skier how speed is controlled. Use strong directional commands to help student turn the correct amount.	X	X	X
Balancing on the outside ski and the inside ski is a result of speed and balance which determines when the skis are parallel.	X	X	X
Use drills / tactics to develop stronger and earlier balance on the outside ski. Experiment with lifting the inside ski. The result should be that both skis are parallel above the fall line.	X	X	X
If inside ski hangs up or a step is needed to match skis, promote inside ski tip and knee lead into the turn. A smooth, round turn shape will also help.	X	X	X
Encourage simultaneous edge change in-between turns. Side-slipping and hockey stops are good drills to develop the edging skills that are needed for parallel turns.	X	X	X
Garlands can be used as needed to focus on either turn initiation or turn completion.	X	X	X
Introduce a pole-plant to help with timing and co-ordination of movements.	X		
Parallel turns may start as skidded turns but gradually work with the skier's balance on edges to develop steered and carved turns	X	X	X
Experiment with different turn-shapes and different terrains as student's skills develop. Aim to challenge student while ensuring success. Short turns, Long turns, rhythm changes, steeper terrain, un-even terrain, etc.	X	X	X

Here is a proposed checklist that you can use to follow your skier's progression:

Progression Checklist	No	Partially Able	Yes
Centered mobile stance at all times… Is the student centered and mobile at all times?			
Steering coming from the legs… Does the lower body lead the steering effort?			
Balance… Is the student balanced on their edges?			
Focus on the timing and coordination of movements to carry momentum from one turn to the next. Is there a smooth transition between the turns?			
Steering / pivoting… Is the steering smooth and continuous throughout the turn?			
Different turn shapes … Is the student able to change the turn radius?			
Speed control … Is the student able to stop by turning across the fall line on both sides?			

Lift Procedures:

- Before riding a lift with a student with an ID it may be necessary to clearly explain the procedures and expectations. Front load the student with information about the lift before getting on it. To convey this information, the instructor may include pictures, photos, diagrams, social scripts etc. in their explanation. It may be useful to give as much information as possible, depending on the student's developmental and communication abilities.
- Clearly define the types of behaviours which are expected when riding a lift. Remember there are many steps involved in riding a lift. Use clear and simple language, and a communication method which is appropriate for the student. It may be necessary to repeat the rules for riding a lift regularly.
- Some examples:
  - "When we wait in line we keep our hands to ourselves"
  - "When we ride the chairlift, we will keep our bottom on the seat and try to keep our body still."
  - "Stay on the chairlift until the instructor tells you it is time to get off."
- Give clear guidelines (be directive)
- Safety on lifts; Explain clearly what are the important rules to observe while in the chairlift. Have the individual repeat the explanations in his own word
- People with ID, in particular children, may not have a strong awareness of safety concerns. This may involve using a harness, tether or physical support to ensure the individual remains on the lift.

Lifts: How to reassure the skier

Be aware that riding a lift may produce anxiety in some individuals. Try to prepare the student thoroughly in a meaningful and understandable manner. The individual may require a slow and thoughtful step-by-step process before actually riding a lift.

For example:

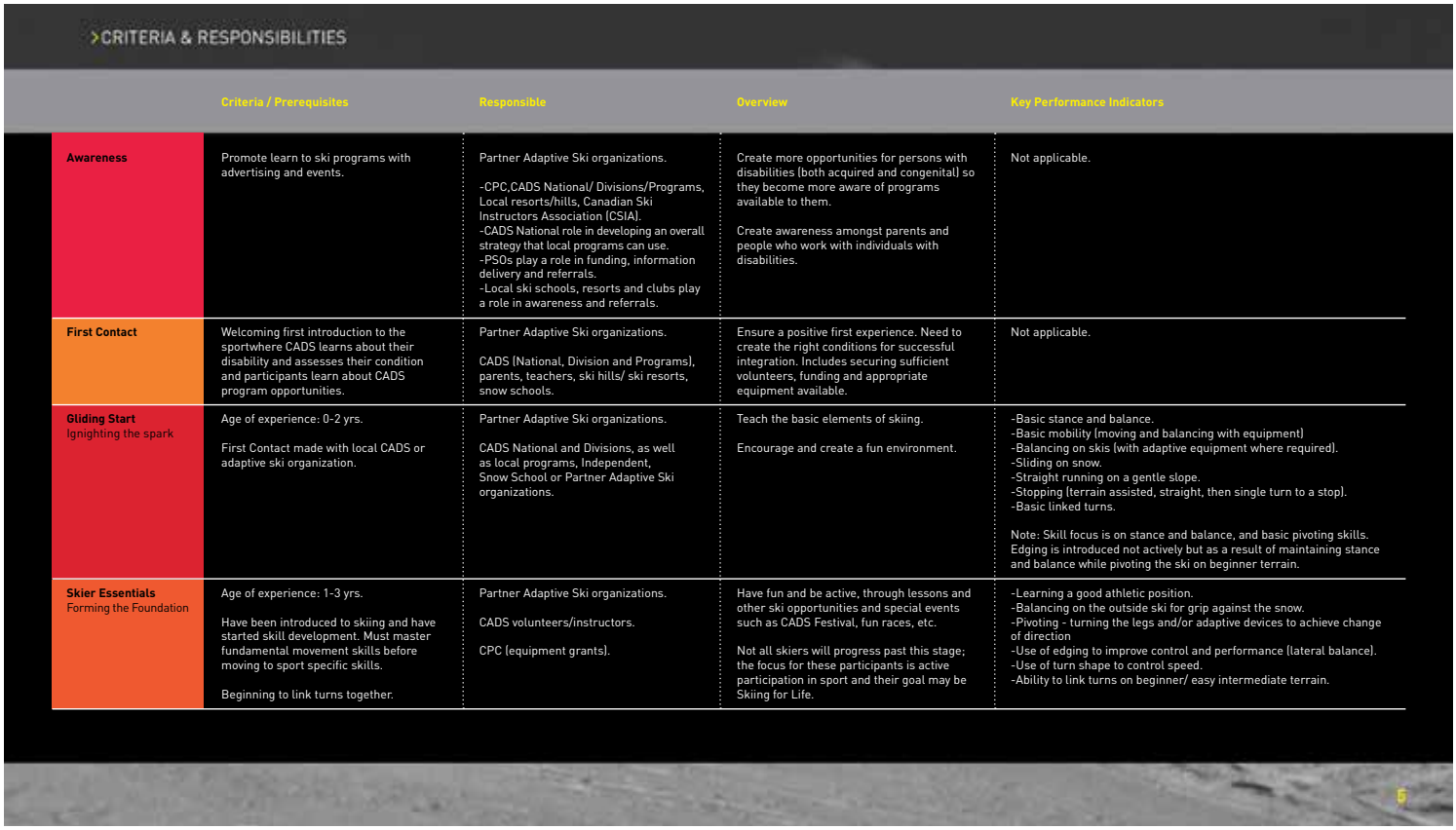
1. Talk about the lift and look at pictures
   a. Look at the lift from a distance.
   b. Look at the lift up close.
   c. Watch people load the lift.
      i. Explain all steps: walk through maze
      ii. Wait until the lift operator indicates we can walk again
      iii. Walk up to a specific line (be precise and clearly indicate where to stop walking)
      iv. When and where to sit on the chair (be directive)
      v. Wait until the instructor tell to put the safety bar down
      vi. Watch for your legs and ski boots
      vii. Put your skis onto the foot rest bar
2. Explain what you expect from them (Behavior)
3. Explain what will happen at the top:
   a. Get both feet off the foot rest bar
   b. Raise the safety bar
   c. When to stand up (be directive)
   d. Where to go (be directive)
      i. Straight run and stop when I say stop (use the communication methods that best work)
      ii. Straight run then turn left (or right) and then stop
      iii. Be directive
4. Standing in line but not get on the lift.
5. Getting on the lift
   a. For the first few chairlift rides, ask the chairlift operator to slow down the chair.
   b. Tell them how many towers this chair needs to go through before getting to the top
6. Getting off the lift
   a. From top, move away of the crowd
   b. From this point on, tell your student what will happen: e.g. we will ski down this slope, it is called XYZ. First we will do X number turns and then we will stop. Follow me.
7. Tell your student how many times you will be going up the hill using the chairlift before going inside the lodge for a break. Usually, three is a good number. This might likely become part of the routine.

Safety Recommendations:

- It is strongly recommended that all individual wear a helmet to promote safety in the event of a fall or striking or being struck by the skiing public.
- It is strongly recommended that individual should also wear eye protection.

Appendix 1

Long Term Skier Development (LTSD) Chart Pathway



>CRITERIA & RESPONSIBILITIES

	Criteria / Prerequisites	Responsible	Overview	Key Performance Indicators
Awareness	Promote learn to ski programs with advertising and events.	Partner Adaptive Ski organizations. -CPC,CADS National/ Divisions/Programs, Local resorts/hills, Canadian Ski Instructors Association (CSIA). -CADS National role in developing an overall strategy that local programs can use. -PSOs play a role in funding, information delivery and referrals. -Local ski schools, resorts and clubs play a role in awareness and referrals.	Create more opportunities for persons with disabilities (both acquired and congenital) so they become more aware of programs available to them. Create awareness amongst parents and people who work with individuals with disabilities.	Not applicable.
First Contact	Welcoming first introduction to the sportwhere CADS learns about their disability and assesses their condition and participants learn about CADS program opportunities.	Partner Adaptive Ski organizations. CADS (National, Division and Programs), parents, teachers, ski hills/ ski resorts, snow schools.	Ensure a positive first experience. Need to create the right conditions for successful integration. Includes securing sufficient volunteers, funding and appropriate equipment available.	Not applicable.
Gliding Start Ignighting the spark	Age of experience: 0-2 yrs. First Contact made with local CADS or adaptive ski organization.	Partner Adaptive Ski organizations. CADS National and Divisions, as well as local programs, Independent, Snow School or Partner Adaptive Ski organizations.	Teach the basic elements of skiing. Encourage and create a fun environment.	-Basic stance and balance. -Basic mobility (moving and balancing with equipment) -Balancing on skis (with adaptive equipment where required). -Sliding on snow. -Straight running on a gentle slope. -Stopping (terrain assisted, straight, then single turn to a stop). -Basic linked turns. Note: Skill focus is on stance and balance, and basic pivoting skills. Edging is introduced not actively but as a result of maintaining stance and balance while pivoting the ski on beginner terrain.
Skier Essentials Forming the Foundation	Age of experience: 1-3 yrs. Have been introduced to skiing and have started skill development. Must master fundamental movement skills before moving to sport specific skills. Beginning to link turns together.	Partner Adaptive Ski organizations. CADS volunteers/instructors. CPC (equipment grants).	Have fun and be active, through lessons and other ski opportunities and special events such as CADS Festival, fun races, etc. Not all skiers will progress past this stage; the focus for these participants is active participation in sport and their goal may be Skiing for Life.	-Learning a good athletic position. -Balancing on the outside ski for grip against the snow. -Pivoting - turning the legs and/or adaptive devices to achieve change of direction -Use of edging to improve control and performance (lateral balance). -Use of turn shape to control speed. -Ability to link turns on beginner/ easy intermediate terrain.

Appendix 2

Safety and Risk Management

When you, as a ski instructor, agree to undertake the instruction of a person, whether that persons is an adult or a child, you enter into a special relationship with that individual, out if which the court will impose upon you a duty of care for the safety of that student. This duty of care commences when you first meet your student at the start of the lesson and does not end until the lesson is completed.

It is very important to bear in mind that, in the eyes of the law, your role as an instructor is not simply to educate your student on the finer points of skiing, but rather act as a knowledgeable, responsible and vigilant guide to the student while on the mountain. An instructor must teach in strict accordance with the Alpine Responsibility Code, and ensure that the students under supervision are skiing in full compliance with the code, as well as understand the reasons for doing so. The instructor must exercise great judgement in selecting the terrain upon which the lesson will take place, to ensure that it is commensurate with the student's ability and minimizes the risks arising from natural hazards. The Alpine Responsibility Code is presented in Appendix 3.

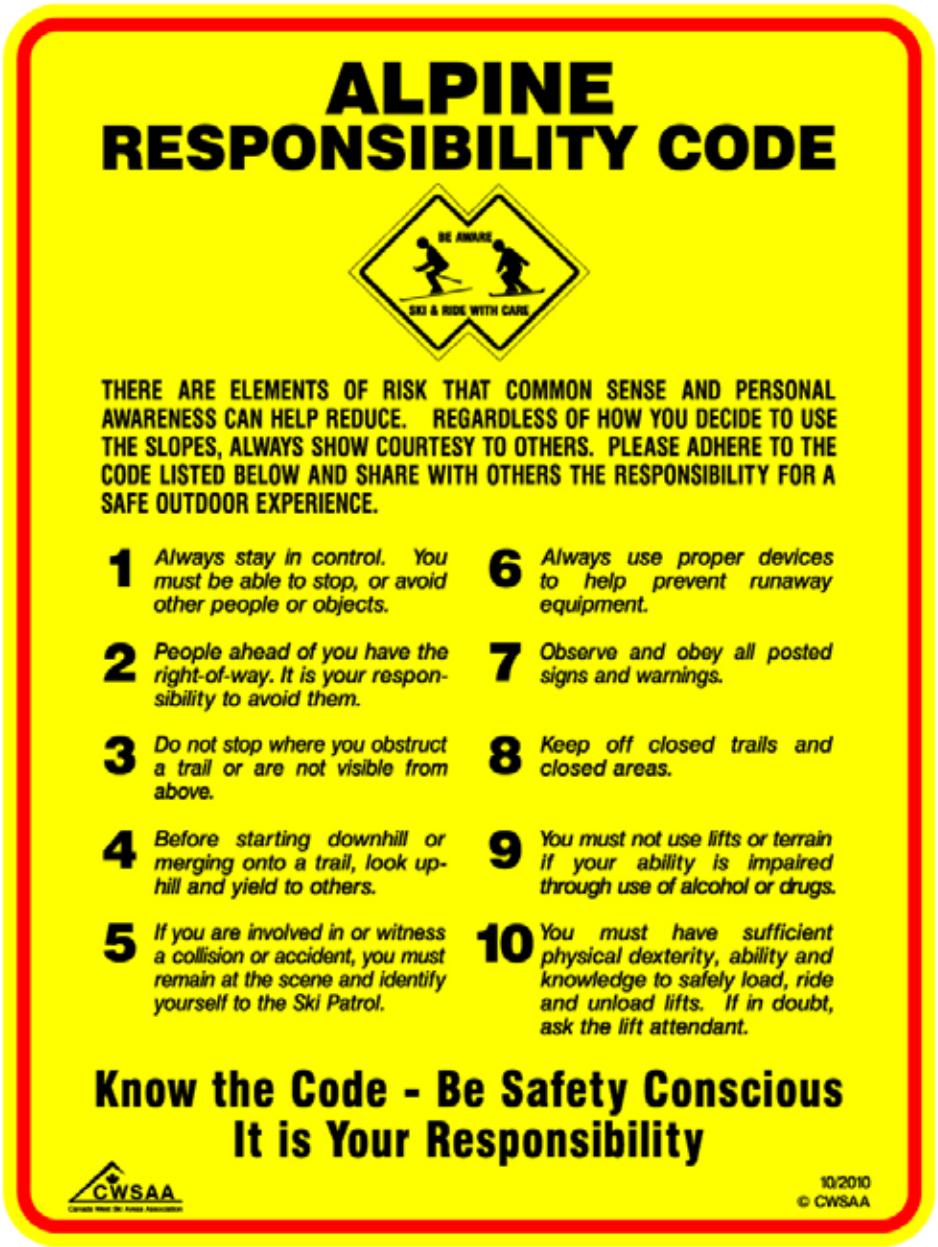
Safety and liability concerns are part of every operation at a ski resort. Ski instruction carries its own set of risks and responsibilities. Recognition and avoidance of risk is the first step. Instructors should be aware of ski area layout and equipment as well as traffic patterns. Monitor and consider conditions constantly. Use your best judgement to avoid situations that could put your clients at risk. If you find yourself in situations that are inappropriate for your clients, use your knowledge to reduce the risks and guide your clients to safety.

In case of an accident, know and respect snow school and resort policies. The general guideline presented here is superseded by your resort's policy.

1. Stay with the injured person. Reassure and make them comfortable, but do not move them unless there is a high risk of further injury or death, in which case you must assure your own safety and then remove the injured person from further danger.
2. Notify ski patrol immediately by sending a blocker, volunteer/helper, or passing skiers, to the bottom of the closest lift. Be sure they know how to get to the lift and that they can describe the location and nature of the accident.
3. If with more than one skier, keep the group together. If your students are adults, you can arrange a meeting place for later. However, it is generally preferred to keep everyone together.
4. Take note of the following:
   - Note the details relevant to the accident
   - Time and location
   - Conditions and visibility
   - How the accident occurred
   - Instructors and students relative location at the time of the accident. Note measurements if appropriate. If another party is involved keep them at the scene and note their name and contact information. If there are witnesses, keep them on the scene and ask them to make a statement to ski patrol. Note any relevant information in regard to your instructions to the class and the injured party's response to your instructions.
5. Fill out required accident reports at the snow school, ski patrol and CADS insurance company. Follow up with patrol to see what the injury was and what steps were taken.
6. Do not make any statements or speculations on the accident. Refrain from judgments and comments.

Appendix 3

Alpine Responsibility Code



ALPINE RESPONSIBILITY CODE

BE AWARE
SKI & RIDE WITH CARE

THERE ARE ELEMENTS OF RISK THAT COMMON SENSE AND PERSONAL AWARENESS CAN HELP REDUCE. REGARDLESS OF HOW YOU DECIDE TO USE THE SLOPES, ALWAYS SHOW COURTESY TO OTHERS. PLEASE ADHERE TO THE CODE LISTED BELOW AND SHARE WITH OTHERS THE RESPONSIBILITY FOR A SAFE OUTDOOR EXPERIENCE.

1. *Always stay in control. You must be able to stop, or avoid other people or objects.*
2. *People ahead of you have the right-of-way. It is your responsibility to avoid them.*
3. *Do not stop where you obstruct a trail or are not visible from above.*
4. *Before starting downhill or merging onto a trail, look uphill and yield to others.*
5. *If you are involved in or witness a collision or accident, you must remain at the scene and identify yourself to the Ski Patrol.*
6. *Always use proper devices to help prevent runaway equipment.*
7. *Observe and obey all posted signs and warnings.*
8. *Keep off closed trails and closed areas.*
9. *You must not use lifts or terrain if your ability is impaired through use of alcohol or drugs.*
10. *You must have sufficient physical dexterity, ability and knowledge to safely load, ride and unload lifts. If in doubt, ask the lift attendant.*

Know the Code - Be Safety Conscious
It is Your Responsibility

CWSAA

10/2010
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Appendix 4

Code of Ethics

Duties

- Support personnel and partner organizations
- Provide up to date CADS instruction
- Attend CADS professional development and training sessions when available
- Demonstrate exemplary professional behavior at all times on or off the hill
- Be empathetic with participants and other CADS instructors
- Be respectful when dealing with problems
- Be responsible

Professionalism

- Provide a consistent professional image
- Adopt appropriate personal grooming and appearance
- Dress appropriately adopting clothing that is clean and in good condition
- Maintain a positive can do attitude
- Be punctual at all times
- Show respect for participants and peers
- Maintain a knowledge of Resort policies
- Be fully aware of the power in relationships between Course Conductor and participant – avoid sexual intimacy, sexual harassment by yourself and others

Safety and Responsibility

- Be fully versed in the Duty of Care
- Know and utilize the Alpine Responsibility Code
- Practice safety at all times and know the procedure for handling accidents
- Be fully aware of liability issues

Teaching Effectiveness

- Fully understand your role
- Utilize effective communication – verbal and non verbal
- Understand the four learning styles – watcher, thinker, feeler, doer
- Understand Motor Learning and the teaching implications
- Set attainable goals and objectives
- Fully utilize AOT and then on hill assessment for development in each discipline
- Utilize terrain and tactics to ensure development
- Utilize mileage not talking for improvement
- Provide constant positive feedback
- Utilize techniques such as Whole/Part/Whole and Guided Discovery for success

Appendix 5

Code of Conduct:

Respect for Peers and Participants

- Act in a manner respectful to all participants
- Provide feedback to participants in a caring sensitive manner
- Respect individuality and refrain from intruding in personal affairs
- Treat all participants in an equal manner regardless of race, athletic potential, color, religion, political beliefs, social status, sexual orientation, place of origin.
- Empower participants to be responsible for their own behavior, performance and decisions
- Keep information for each participant confidential both verbally and in written form

Teaching Responsibility

- Performed safely with the best interest of all participants in mind
- Keep up to date with relevant information
- Be aware of your personal attitudes, beliefs, values and how they may affect your actions as a CADS Instructor
- Do not assume responsibilities outside of your training
- Do not compromise safety.
- Apply every reasonable effort to help the participant achieve success
- Be fully aware of power in teaching relationships between you, the instructor and participants
- Avoid sexual intimacy with participants. Zero tolerance.
- Abstain and hold intolerable all forms of harassment, coercion to engage in sexual activity, or sexual oriented comments, gestures or touching that are unwelcome, offensive, intimidating and harmful

Integrity

- Be honest, sincere and honorable in relationships with others
- Accurately represent your teaching qualifications, competencies and affiliations
- Declare conflicts of interest
- Avoid discrediting specific ski/snowboard equipment manufacturers, CADS equipment manufacturers, sponsors, suppliers or industry partners

Honoring Sport

- Promote the value of sport for all individuals and partners.
- Be a positive role model by maintaining the highest standard of personal conduct, image in personal skiing/snowboarding and teaching skiing/snowboarding in the CADS setting
- Promote cooperation with ski schools, resort, public and other participating groups that promote skiing/snowboarding
- Respect the efforts of others
- Respect the resort and in particular do not take any privileges given as a right and do not abuse them or cause embarrassment to any instructor or resort personnel

Appendix 6

CADS Student Information and Medical Form

CONFIDENTIAL

Date: _____

❑ NEW Student ❑ RETURNING Student

Section 1- PERSONAL INFORMATION

Last Name: _____ First Name: _____ Age: ___
Date of Birth: _____ (yy / mo / day). Provincial Health Card Number: __+_____
Gender: ❑ Male ❑ Female
Height:_____ Weight:_____

Section 2- EMERGENCY CONTACT INFORMATION

Primary Address: Street/ _____
City/ _____ Postal Code/ _____
Home Phone: _____
Cell Phone: _____
E-mail Address: _____
Parent/ Guardian Names (if applicable): _____
Parental consent (if child) for retrieving from Resort if not Parent or Guardian _____
Name of Emergency Contact: _____
Relationship to Skier:_____ Phone Number: _____

Section 3- SKI/ SNOWBOARD EXPERIENCE

Skied or Snowboard before?_____(Y/N). If Yes, complete Section 3, if No, go the section 4.

Level of skiing/ boarding ability:
Never skied/ boarded ___ Beginner___ Intermediate___ Advanced___
Number of days ____ or seasons ____ of snow sport activity.
Tethered___ 3 Track___ 4 Track___ Sitski : (Quadski:____BiSki:____MonoSki:____ other sitski equipment: _____)
Tandem:_____ Snowboard _____ Stand-up skier____
Details of your experience:_____

Section 4- GENERAL INFORMATION:

PHYSICAL information:

Allergies (specify applicable environmental/ food/ medical)_____
Does participant use/ carry an epi-pen? _____(Y/N)
Amputee _____ specify type _____ location _____
Arthritis_____
Arthrogryposis_____
Asthma_____
Atlanto- axial dislocation (please list last x-ray date) _____
Bladder/ Bowel issues or adaptations_____
Brain Injury _____ (specify) _____
Cerebral Palsy_____
Congenital Heart Disease_____
Cystic Fibrosis_____
Diabetes_____
Epilepsy_____
Feeding Tube_____
Hearing Impaired _____ (specify degree) _____
Heart Problems_____
Multiple Sclerosis_____
Muscular Dystrophy_____
Parkinson's disease_____
Post-Polio_____
Respiratory Disease_____
Scoliosis_____
Seizure disorder : _____
If Yes: Frequency_____ Duration_____ Typical time of day_____
Type_____ Date of last seizure _____
Shunt_____
Spina Bifida_____
Spinal Cord Injury _____
If yes: level _____paraplegic_____ quadriplegic _____ Complete_____
incomplete_____
Stroke _____
If Yes : degree _____side affected _____
Visual Impairment _____
If Yes: degree_____ glasses_____ contacts worn _____
Other (specify) _____

MOBILITY information:

Independent: ___
Person- Assisted (specify): ___
Braces: ___
Canes/ crutches: ___
Manual Wheelchair: ___
Electric Wheelchair: ___
Is transfer assistance required? ___
Describe any challenges with mobility and/ or gait that may affect participation in snow sports: ____

Person living with Visual Impairment:
VI impairment (disease) and degree of vision in : Left eye _____Right eye_____
Mobility requires use of : Canes _____guide dogs _____
Secondary hearing loss challenges - identify Left_____ Right____ required corrective measures: louder guide voice _____
ski /walk closer to guide _____ helmet radios_____
Muscle tone_____ (hypertonicity____ hypotonicity____)

DEVELOPMENTAL information:
Autism: _____ level 1_____Level 2___ Level 3_____
Down syndrome: _____
Severity code (Mild _____
Moderate_____
Severe___ Profound ___)
Fragile X_____
Other (specify): _____

LEARNING DISABILITY information:
Perceptual difficulty: ___
Brain injury: ___
Distractibility: ___
Hyperactivity: ___
Dyslexia: ___
Attention Deficit Disorder: ___
Other (specify): ___

BEHAVIOUR information:
Acting out: ___
Frustration tolerance:____
Social Skills:____
Aggressive: ___
Self-abusive: ___
Impulsive: ____
Self esteem:_____
Other (specify): ___

PSYCHOLOGICAL / EMOTIONAL information:
Anti-Social: ___
Anxiety: ___
Depression: ___
Disorientation: ___
Eating Disorder: ___
Neurosis: ___
Psychosis: ___
Schizophrenia: ___
Substance abuse: ___
Other (specify): ___

COMMUNICATION information:
Verbal: ___
Non-Verbal: ___
Signs: ___
Other: ___

Section 5- ADDITIONAL INFORMATION

Current medications? Please list type and purpose: _____
Recent injuries, illnesses, surgeries or hospitalizations we should be aware of (describe): ___

Section 6- LEARNING ENVIRONMENT

How does the participant behave when upset or frustrated? _____

Methods to make learning easier (e.g. visual, tactile, verbal, etc.): _____

Is the participant able to follow directions? _____ To problem solve? _____

Any additional information that would be helpful for the instructor: _____

VIs determination of whether they see better at night? During day? _____

VIs other environment considerations : low light conditions_____ bib color selection _____

Section 7- PARTICIPANT RECREATION AND LEISURE INFORMATION

List other sports/ activities participated in: _____

Which of the following barriers restrict physical activity? Indicate all that apply.
Lack of endurance: ___ Lack of coordination: ___ Lack of mobility: ___ Lack of flexibility: ___ Spasticity: ___ Paralysis: ___
Lack of strength___ Muscle Tone: ____ Susceptible to cold: ___ Susceptible to overheating: ___ Susceptible to impact: _____
Other (specify): _____
Hyperactive and Hypoactive:_____

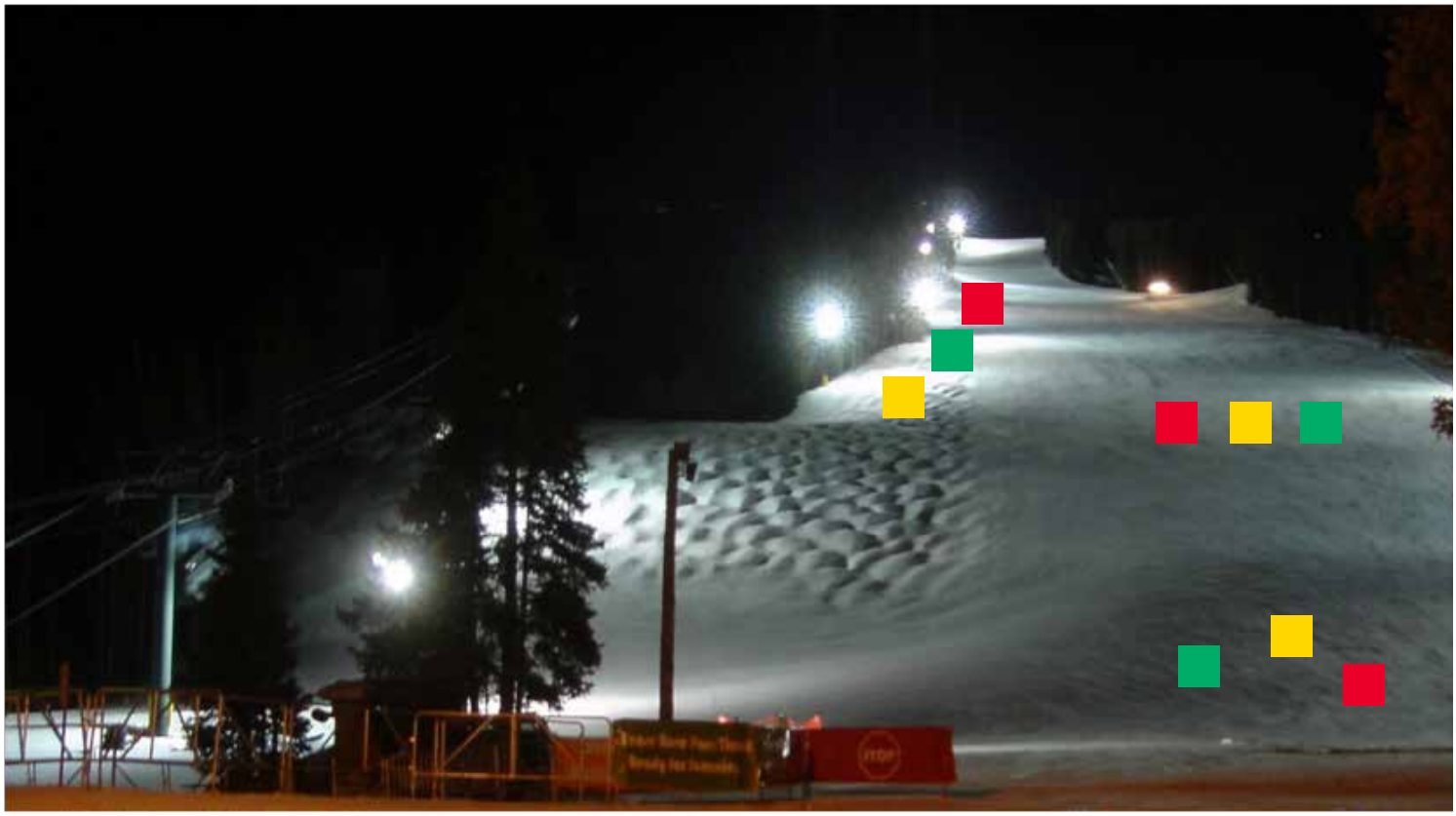
Section 8- OTHER

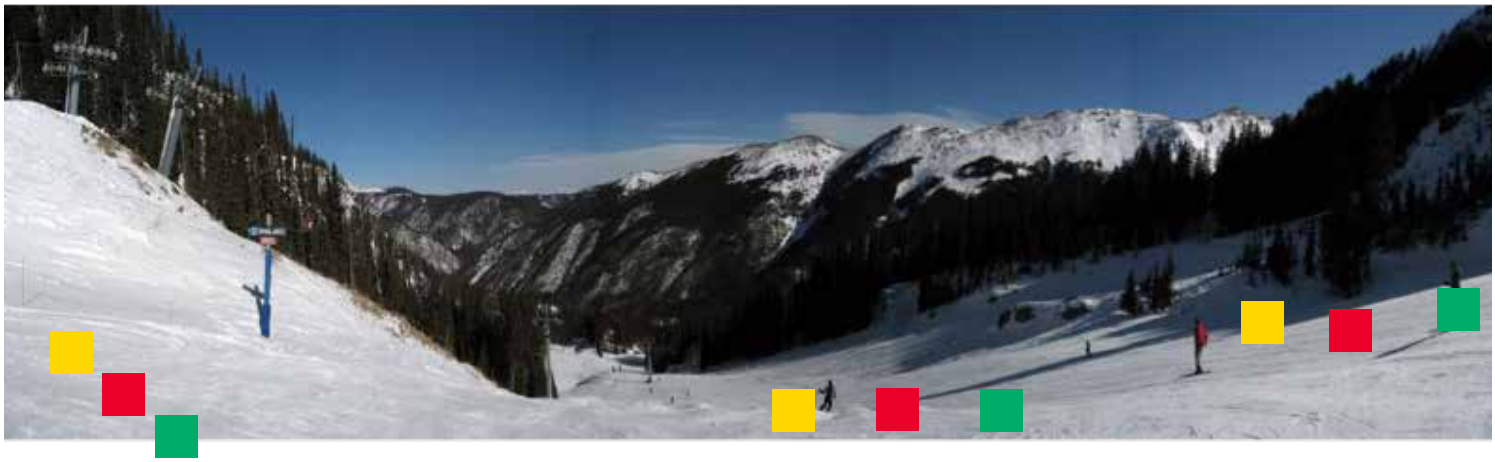
What expectations do you have of your CADS experience? _____
Please write a personal goal that the student will work towards through participation with CADS: _____

Appendix 7

VI Determination of Guide Bib Colors

Determination of the level of usable vision using colors. Ability to identify different colors in different varying conditions.





Appendix 8

Safety & Awareness Questionnaire for Instructor / Guides

Note: When selecting the correct answer, there may be more than one correct answer.

Q1. Which of the following are prudent considerations particularly for new VI skiers or boarders?

A. Ask them what they can see.

B. Walk them around the lodge to help identify sounds inside. Tell them what is where: where they should meet to start the ski program, washroom location, location of ski rentals, etc.

C. Outside have them practice entering their bindings. Have them feel the equipment. Explain how the boots should feel. Have them walk around in their boots.

D. Walk or guide them as you either ski or snowboard toward the lift. For a new skier or boarder, be sure to discuss the sounds outside; walk them around to hear the lift, snowmaking machines, snowmobiles, skis/ snowboards on snow, etc.

Q2. Which of the following equipment considerations are appropriate to assess/discuss regarding safety?

A. Whether they have a helmet, safety vest and light.

B. Confirm that the VI skier or boarder knows where to put their skis or board outside the lodge.

C. Do they have appropriate dress, goggles, boots, skis or board that fit and are in good working order?

D. Are ski aids necessary?

Q3. Prior to each program outing in the ski session, which of the following capabilities are appropriate to assess / discuss with blind or visually-impaired skiers or boarders, or their parents?

A. Vision at night & during day; how far can they see, experience on lift and skiing, what details can they see (i.e. bumps, ice, shadows, rocks etc.).

B. Other health issues or disabilities that may affect their skiing such as: hearing and/or any attention deficits. Can they hear guiding over other noises on the hill? Are they aware of their surroundings and can they maintain concentration?

C. Determine their athletic ability and physical strength in order to determine what ski hill to choose.

D. The score of the hockey game and whether the favoured team is winning.

Q4. Are any of the following recommended when taking a VI skier or boarder on the lift?

A. Explain the lift operation; how to get on and off and tell the operator if it is their first time or if they are inexperienced with that particular lift.

B. Ensure that the VI skier or boarder is comfortable turning around to chat with the folks on the chair behind.

C. Position a guide on each side of the VI skier or boarder; if necessary, hold their poles; count down the lift as it approaches.

D. Assist the VI skier or boarder as necessary when exiting the lift by directing the VI skier's or boarder's arm or by directing their ski with your ski. Explain what the VI skier should feel when exiting a lift.

Q5. Which of the following are appropriate considerations when on the hill with a blind or visually impaired skier or boarder?

A. If unsure about the VI skier's or boarder's ability, practice stops and turns on easy terrain in order to assess them before moving to more challenging terrain or up the lift.

B. Ask the VI skier if they want a description of the surroundings before each descent, and a description of the terrain as you ski.

C. Follow directly behind the VI skier in their ski tracks, calling directions.

D. Ski uphill of the VI skier, placing yourself between the hill traffic and your VI skier, mirroring their turns as best as possible and calling directions.

Q6. Which of the following would be considered prudent hill safety practices?

A. When guiding, maintain a safe distance from the side of the hill in case the VI skier or boarder doesn't hear you or misunderstands a call.

B. Be visible at all times, and if the VI skier or boarder falls, stand directly above them to protect them.

C. If you are not comfortable when you are approaching a busy spot on the hill, stop the VI skier or boarder and proceed when safe.

D. Allow your VI skier or boarder to choose whether or not to wear safety equipment prescribed by the CADS program.

Q7. Which of the following are good vocal practices to guide VI skiers/boarders on the hill?

A. Talk directly to the VI skier/boarder; speak clearly and loud enough to be heard above other noises.

B. Use a panic free voice tone, being firm with directions on turns and stops/starts.

C. Before starting to ski, advise VI skiers/boarders to stop immediately if they cannot hear the guide's voice.

D. Scream at the top of your lungs if your VI skier/boarder is not responding.

Q8. What are good practices for helping a VI skier or boarder progress?

A. Take it slow at the beginning. Gain your VI skier's/boarder's confidence.

B. Allow the VI skiers/boarders to feel your legs so they can understand correct positioning. With their permission, use their hands to demonstrate ski position (i.e. wedge, parallel).

C. Take the VI skier/boarder on more advanced hills before they are ready, in order to make other hills seem easier.

D Depending on the level of the VI skier/boarder, progress from walking with equipment, to learning how to stop, slide, make a turn, and then link turns, Do not progress to the lift until they perform these skills.

Q9. What is recommended in the event of an accident or incident involving the VI skier/boarder and or guide?

A. Report all accidents or incidents to the program supervisor as soon as possible.

B. If a blocker is not available, stop a public skier or guide and ask them to get a patroller. Ensure that the patrol is aware that the VI skier/boarder is blind or visually impaired and may need special care and/or more verbal explanations.

C. Ensure that the accident area is visible to other skiers and boarders to prevent the situation from further incidents.

D Ensure that the Alpine Responsibility Code (Appendix 3) is being followed by guides and VI skiers/boarders.

Q10. What are appropriate actions in cases of VI skier's/boarder's questionable behaviour during the program?

A. First discuss it with the VI skier/boarder, request it be terminated, advising them clearly on next steps you will take.

B If inappropriate behaviour continues, bring VI skier/boarder back to the lodge and report to the supervisor. End the lesson.

C. Ask the supervisor to discuss with the VI skier/boarder or their parents about the inappropriate behaviour and about a more suitable behaviour to adopt to participate in the program.

D. Let it go, do nothing, the VI skier/boarder will get over it or the next guide will have the same "fun" you did.

VI Safety and Awareness Questionnaire Grid Sheet

Select the correct answer below for each question

Note: When choosing the correct answer, there may be more than one correct answer.

Name _____Date: _____

1 a) A , B
b) A , B, C
c) A, C
d) All of the above

2 a) A
b) B
c) A, C, D
d) B, D

3 a) A, B
b) A, D
c) A, B, D
d) A, B, C

4 a) B
b) A, B
c) A, C, D
d) All of the above

5 a) A, B, D
b) A, B, C
c) A, C
d) B, C, D

6 a) A, D
b) A, B, C
c) B, D
d) A, C

7 a) All of the above
b) A, B
c) B, C
d) A, C

8 a) B, C, D
b) A, B, D
c) A, B, C
d) All of the above

9 a) A, C, D
b) All of the above
c) A, C
d) A, B, C

10 a) A, B, C
b) D
c) B, C
d) A, B

- Note: Answers are found on the next page

VI Safety and Awareness Questionnaire Answers

Question / Answer

1. d)
2. c)
3. d)
4. c)
5. a)
6. b)
7. a)
8. b)
9. d)
10. a)

Appendix 9

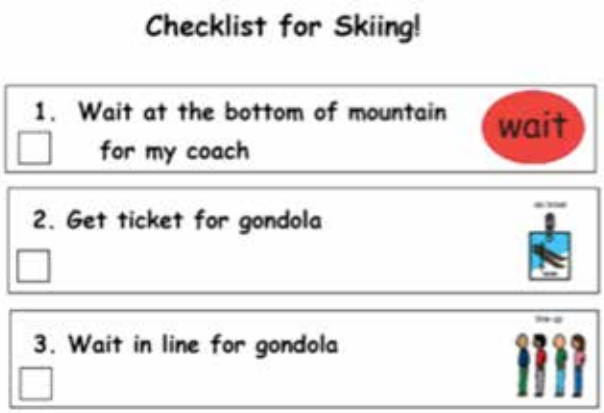
Example of pictograms that could be used for communication

Time Timers iPhone Timer App Countdown App

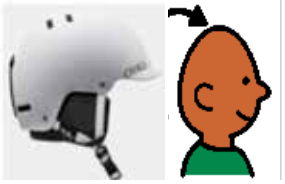


Picture schedules:

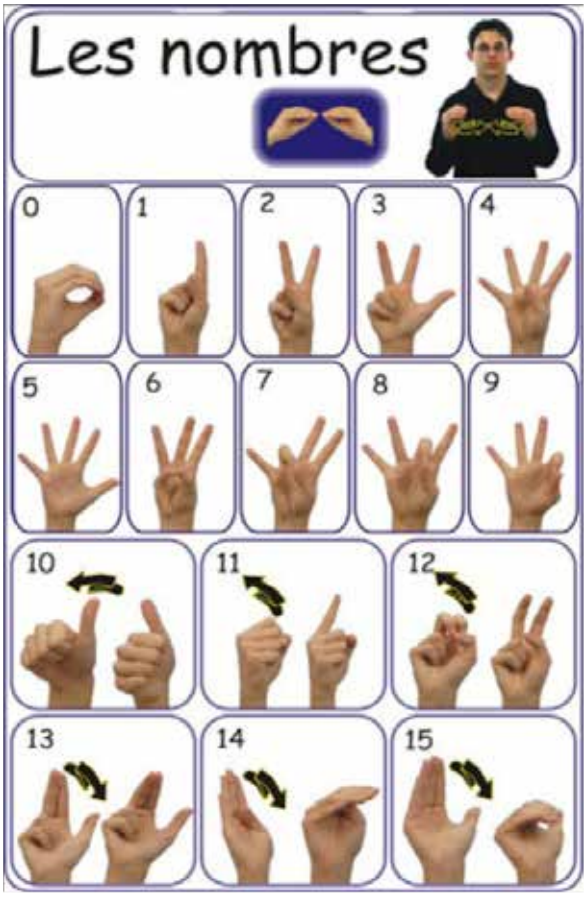
CHOICES		
Play with snowballs	**Build a snowman**	**Go snowboarding**
		



FIRST **THEN**




If they don't wear the equipment properly, picture what is wrong and then what is correct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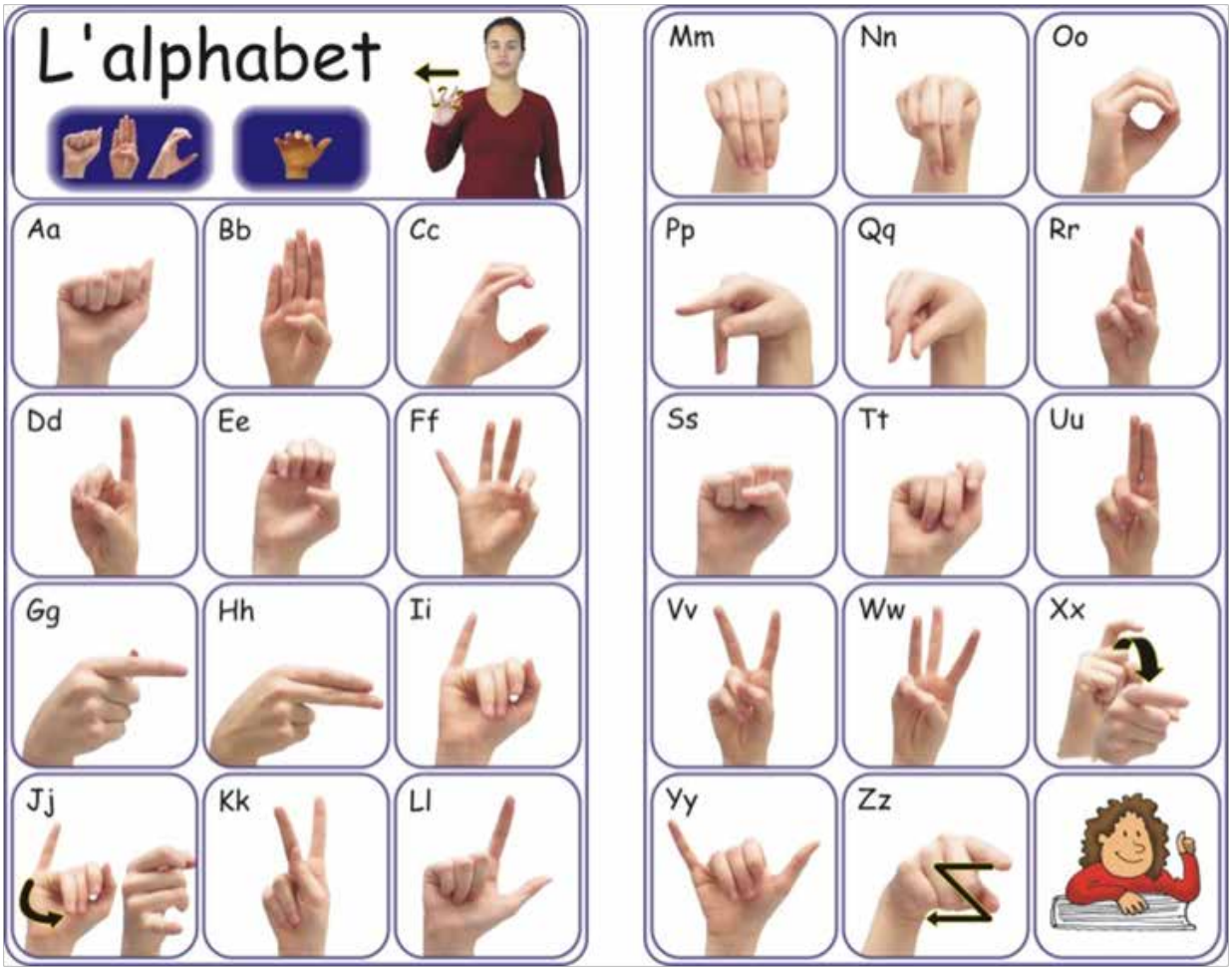
L'alphabet
Aa
Bb
Cc
Dd
Ee
Ff
Gg
Hh
Ii
Jj
Kk
Ll
Mm
Nn
Oo
Pp
Qq
Rr
Ss
Tt
Uu
Vv
Ww
Xx
Yy
Zz

CHOICES		
Play with snowballs	Build a snowman	Go snowboarding
		

CHOICES		
Play with snowballs	Build a snowman	Go skiing
		

CHOICES	
Red ski Boots	Black ski Boots
	

First	Then
	

First	Then
	

First	Then
	

Equipment list

	
	
	
	
	
	
	
	

Appendix 10

Date_____

Student_____

CADS
Fatigue Chart

	Feel no Fatigue	Feel just little tired	Normally tired	I am or feel Tired	I am Exhausted
Beginning of lesson					
End of lesson					

**The time line for the Fatigue evaluation should be adapted to the situation for safety consideration