

Article 1

The Canadian Approach and Entry Level Children

What is the Canadian Approach?

Children learn through guided active play. They will learn more from what a coach can “show” and “do” as opposed to what is “said”. They must have a clear perception of the task (**perceiving**) and then be allowed the time to apply motor patterns to the task (**patterning**).

Therefore, an understanding of the technical and tactical requirements of alpine skiing is a pre-requisite to effective coaching in order to avoid interference with skill acquisition. The Canadian Ski Coaches Federation utilizes two effective approaches to alpine skiing/ski racing:

Technical - competencies in ski specific motor skills

Tactical - strategies for ski performance

The specific motor skills are:

Eight Motor Skills

- stance
- balance
- timing
- coordination
- steering
- edging
- pressure
- carving

Planes of balance and movement

- fore/aft
- vertical
- lateral
- rotational

The strategies for ski performance that are referred to are as follows:

- line (refers to skis side cutting down the fall line)
- turn shape (event specific clean linked)
- type of turn (conducive to speed on specific terrain/snow conditions)
- speed (event specific-maximizing speed on specific terrain)

The above technical and tactical domains serve as a guide with which the coach can monitor motor skills acquisition. A thorough understanding of both approaches will help the entry level coach determine:

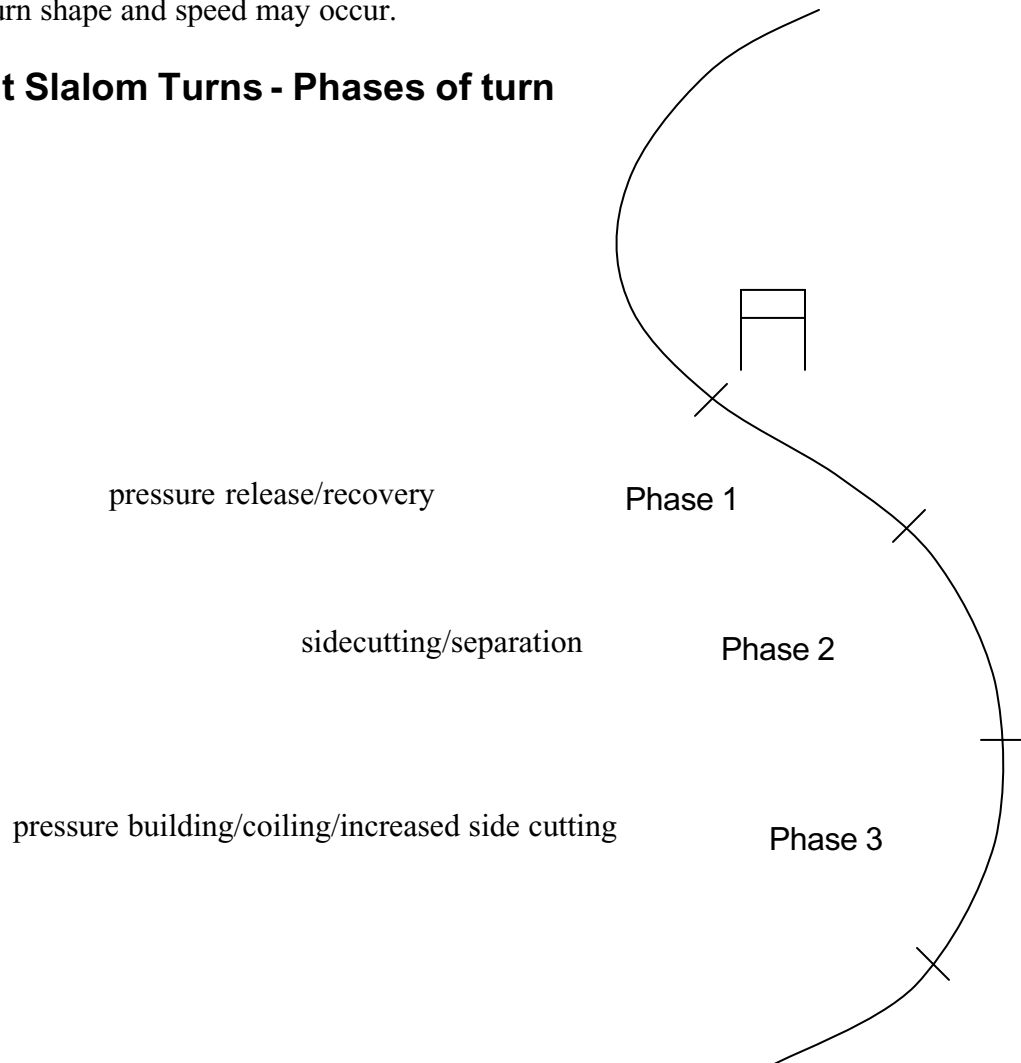
- what to do
- how to do it
- when to do it
- why do it

A good coach can determine “what to do” and “how to do it”. An effective coach will know “when to do it” and “why”, through accumulation of knowledge and practical experience.

Phases of the turn in Relation to Performance at the Entry Level

Due to physical and psychological limitations at this level, slight modifications will be necessary with regard to technique and tactics. Younger skiers should strive to exhibit the same technical integrity as the more skilled children (**model training**) but changes in line, turn shape and speed may occur.

Giant Slalom Turns - Phases of turn



Giant Slalom

Giant slalom is the back bone of alpine ski racing. Skill development in GS free skiing at the entry level is the primary focus. Contemporary ski design and technology has helped bring all four events closer in terms of technical and tactical requirements.

Entry level children should be encouraged to maintain a structurally aligned athletic stance on their skis. The width of stance will be determined by the children's stability skills and relative strength.

A wider stance is promoted to allow lateral mobility but not so wide as to interfere with natural muscular effort or balance and mobility. The coach should not interfere with the child's width of stance unless it inhibits ski performance. The coach must check factors outside the child's control first, in order to help improve performance (equipment factors such as boot stiffness, alignment, ski stiffness, length, etc.). The stance must allow the youngster to edge both skis equally yet remain in balance. Training the youngsters to adopt a variety of widths of stance through out the season will help the children discover an optimal balanced position in various snow conditions and terrain and help them expand their versatility skills.

Phase 1

The coach should encourage children at this level to strive for balance (fore/aft) and vertical movements in the legs. Phase I is a recovery phase where the skis neutralized and gliding (slight edging), the legs are stretched and the movement of the upper body into the next turn is forward and towards the new line of travel (**inclination**). The body's weight must move to the balls of the feet or towards the midpoint of the ski (encourage children to maintain some shin contact with the tongue of the boot).

The youngsters should feel as though the skis are underneath the body in this phase and encouraged not to move inside and away from the skis too fast (**platform and patience**).

The skills required for Phase I take time and effort due to limitations in strength, agility and recovery balance. The length of the arcs that children scribe with their skis will tend to be shorter which will affect line. The radius of the turn will also be tighter which affects the turn shape. These conditions will be due mainly to the length of the skis and whether there is sufficient shape to the skis.

It is very important for the coach to emphasize fore/aft and vertical balance and movement in Phase I so that a **recovery** is established.

Phase 2

The legs must work together and in parallel as much as possible in order to avoid interfering with edging, matching the edge angle of both skis should be encouraged. Separation of the upper/lower body segments at the hip joint should be encouraged. Lateral movement of the largest to smallest joints of the lower body is necessary to establish lateral balance and sidecutting of the skis in this phase.

The smaller leg joints (**knees and ankles**) are moving forward and inside (**shin pressure**) to direct the skis down the fall line to begin the pressure building phase. The coach should encourage the youngsters to make line adjustments here rather than Phase III. Steering of a flat ski for less skilled children may produce a sliding effect in this phase which is acceptable for the very young and less skilled children. Other children will not have the separation skills (**lateral hip mobility and core strength**) so they will adopt a more “square to the ski” position. This should not be construed as a problem as long as ski performance is not affected. If too much sliding of the ski tails or loss of outside ski edging and pressure building is evident then rotational balance and separation skills must be improved.

As the children develop their physical and motor skill capabilities, they will be able to contend with pressure building from side cutting skis. Encourage upper body discipline and separation skills as much as possible to help them understand angulation. The choice of terrain for skill acquisition and time on task is critical to allow skill development. The more moderate and groomed the terrain, the better.

Phase 3

Entry level children should be encouraged to continue side cutting the skis to help increase pressure in the fall line. Contemporary skis allow youngsters to cut clean arcs down the fall line. Try to ensure the youngsters are using both legs to accomplish equal edge angle (**weight is over outside ski predominantly**). Separation skills and lateral balance are critical in this phase as the skier must maintain pressure building in order to maintain the turn shape in the fall line.

Try to encourage the youngsters to maintain a stable arm position to add stability and strength to the upper body so they can be mobile with the lower body. Use the arms as an indicator for balance. They must work in coordination with the legs. The skier must actively direct the skis down and back to the fall line. It should feel like the legs are **coiling** by rotating forward and inward. This is where separation and **angulation** work together in order to produce torque between the upper and lower body.

Overview

It is important for the coach to recognize that the youngest entry level children (chronologically and biologically) will automatically use the larger joints of the skeletal system and the larger muscle groups to help their balance skills. It may appear that these children are limited in their abilities to perform in balance on certain types of terrain (i.e. moderate-steep) but the coach should maintain perspective in terms of growth and development factors that affect youngsters at this age and ability level. Patience, understanding and constructive feedback is essential to the children’s self image.

The long term goal for children at this level is to establish rhythmical coordinated movements where they feel relaxed and tall in Phase 1, progressing to coiling and small in Phase 3. Try to encourage the youngsters to maintain upper body stability in order to utilize lower body mobility. Drills and exercises that encourage separation and angulation will help them build core strength and lateral flexibility.

Short Turns (Slalom)

Modern ski technology has changed the nature of slalom. The links between giant slalom and slalom are closer due to ski design and technical applications. A shorter arc is required in slalom, therefore more agility, recovery balance and precision of movement is required. The Canadian approach to slalom for entry level children is similar to giant slalom. Modern slalom is modified giant slalom. The technical and tactical components are similar in execution but slalom demands more precise patterning of motor skills. The technical and tactical aspects of slalom should be used to add variety and diversity to the program. Adaptation to slalom type turns will depend on the youngster's athletic abilities in the areas of balance, timing, and coordination. General applications of the technical components of slalom should remain as simple as possible for this age group. Constant referral to giant slalom will give entry level children a solid frame of reference to which they can relate.

It is recommended that entry level coaches employ a variety of types of turns for effective skill requisition, specific reference to slalom should be minimized due to the precision and accuracy that is required in contemporary slalom.

Instead, coaches are encouraged to refer to short turns as a means of adding variety and diversity to children's overall skill development. Allowance must be made for the variations in **perceiving and patterning** of short turns at the entry level & specifically the youngest of this age group.

Phase 1

Entry level children lack the strength (**core/leg**) of more experienced skiers. Encourage the youngster to remain over top of the bindings to remain aligned in the skeletal system and musculature. Alignment drills should be used to help the children become kinetically aware of a balanced fore/aft position in Phase 1. Movement is forward and slightly inside the direction of travel. Emphasis on a disciplined stable upper body and arm position will help develop core strength and stability.

Phase 2

The knees and ankles direct the skis (**shin pressure**) in the direction of travel (**down the fall line**). Try to encourage the skier to remain in contact with the front of the boots (shins against the tongue of the boot). Both legs help direct the skis. Separation skills will allow the children to maintain lateral and rotational balance in order to sidecut both skis.

Phase 3

Encourage the children to continue sidecutting the skis down the fall line to maintain a clean turn shape. Ensure the upper body is stable, which allows the lower body to direct the skis. Emphasize contact with the tongue of the boot in a forward and inside direction to promote progressive edging and pressure building skills. Try to encourage the use of a pole touch to help develop ski specific coordination skills. Pole action will help the skier become aware of the need to re-balance over the skis in Phase I and will also help develop a sense of linking the turns in rhythm (**patterning**). The entry level coach **should**

not emphasize the development of slalom skills for this age group. Most of the youngsters will lack the agility and balance skills necessary for effective short turn skiing. Utilizing short turns as a tool to add diversity and versatility to the children's motor skill development will be more useful in their overall athletic development. Encouraging the youngsters to work on the tactical components of short turns (**line and turn shape**) and selecting the right terrain (**flatter is better**) on which they can be successful will help them with their skill acquisition and confidence.

How to Apply the Canadian Approach to Entry Level Children

Encouraging entry level skiers to perform technically and tactically is one of the most rewarding aspects of entry level coaching. In a safe learning environment the youngsters will make significant gains in skill development. Children at the entry level must display versatility and diversity in their skiing skills. This means that those youngsters at the upper end of entry level (i.e. 9 – 10 year olds) should be patterning and in some cases adapting motor movements in most snow conditions and on as varied terrain as possible prior to introducing gate training. The coach must ensure that the entry level children have developed a foundation of free skiing skills before specializing in gate training skills.

Open Hill Training

At this level the goal should be **FUN**-damental skill development in a free ski environment (supervised/unsupervised). Encouraging the children to maximize speed on minimum terrain will help them develop the confidence to go fast with little consequence of error. Ensuring that the turns are linked by rhythmical movements and disciplined actions will help them understand the concept of model training. Stance, balance, timing and coordination skills are the predominant motor skills that should be emphasized first. The coach can facilitate skill development by selecting the best terrain for confidence and the pursuit of speed.

- flat terrain - skill acquisition
- varied terrain/snow conditions challenge versatility

Article 2

Development and Progression of Skiing Skill for Entry Level Children

Introduction

Directed and undirected free skiing is the cornerstone of skill development. This section will present some important aspects of how skill development occurs and will provide some practical guidelines that a coach can utilize in his/her efforts to introduce fundamental skiing skills and be effective in skill acquisition. Programming that incorporates the following components will help maximize skiing skill development.

- Supervised Free Skiing
- Drills and games in free skiing
- Obstacle courses and terrain gardens
- Giant slalom in gates
- Giant slalom gate training
- Slalom drills

The entry level coach can maximize skill development by ensuring that he/she utilizes the following in his/her program:

- knowledge of eight motor skills
- knowledge of the planes of balance and movement
- knowledge of the tactical approach to skill development
- planning your training program with specific goals and objectives
- awareness of children's abilities at this level
- terrain selection for skill acquisition
- drill selection (drill/skill matching)
- terrain selection to challenge diversity and versatility

Fundamental Skill Development

Skill acquisition in skiing at the entry level is accomplished through free skiing activities. There is a simple and effective method of ensuring skill development and that is through free skiing as many vertical feet as possible ensuring the following:

- utilizing flat terrain for skill acquisition
- challenging the children by using a variety of snow conditions
- employing a variety of turning radii
- utilizing a variety of terrain to challenge
- employing a variety of coaching intervention methods
- utilizing mental skill training techniques (breathing, goal setting, focus, activation control, visualization)

The most effective coach is the one who is capable of setting up a "safe learning environment" and allowing the children to learn through task teaching and/or guided discovery.

**SAY IT
SHOW IT
DO IT**

**“A picture is worth a thousand words”
“A feeling is worth a thousand pictures”**

An effective coach must employ a variety of coaching methods in order to accommodate the various learning styles by which children learn. The coach should act as a facilitator in order to make complex movements easy to acquire and then act as an observer who is ready to provide timely and relevant feedback. The coaches' method of instruction must match the children's style of learning in order for skill acquisition to take place.

DO NOT RUSH INTO GATES

Sequential training from open hill skill training to games, exercises and drills with bamboo, foamies or stubbies and eventually gates, requires planning and patience. It is imperative that the children are perceiving, patterning and in some cases adapting line and turn shape in free skiing before being introduced to a gate training environment. It must be understood that children need to be allowed to progress through the stages of skill development once gate training is introduced. Practice time that promotes a high success rate should be allowed in order for the youngsters to perceive and pattern the specialized requirements in a gate training environment. The sequence of events should follow a pattern such as the following:

- technical/tactical free skiing
- games and exercises in gates (obstacle courses, over/under)
- drill courses - rhythm, rhythm change
- gate training
- competition (team environment)

An effective coach should plan his/her sessions in gates with specific tactical objectives in mind:

- line
- turn shape
- rhythm
- looking ahead

It is important for the coach to teach the children how to monitor their anxiety and activation levels so that learning takes place. Planning and conducting a creative session which employs elements of mental skills training, variety and **FUN** while learning will always be successful and motivating. Above all, keep your learning environment **SAFE** by being aware of the inherent risks in gate training.

Article 3

Effective Coaching at the Entry Level

Introduction

Entry level children (ages 6 - 10 years old) represent the largest number of skiers within the Canadian Alpine Ski System. One of the tasks of the entry level coach is to understand the different stages of development within this age group and to ensure the needs of the children are being met not only to help them develop to their potential but more importantly to maintain the youngster's desire to remain involved in alpine skiing and ski racing.

Effective coaching at this level requires creativity and variety in program design. The coach must understand how learning occurs and set up the environment so that children can learn from situations and also recognize what they have learned through self discovery. Although, every child does not desire to become a world class alpine athlete, every child deserves the chance to experience the joys of learning new skills and performing those skills well. It is incumbent on the coach to create these opportunities for children to learn in a **SAFE** environment.

An effective coach must understand:

- how to analyze performance (**observation**)
- how to recognize positive aspects of performance (**evaluation**)
- how to recognize the cause of poor performance (**diagnosis**)
- how to provide the athlete with clear direction to improve performance (**prescription - skill/drill matching**)

Program Design

It is important to mention that a coach's approach to children at the entry level must include all *five* factors of what is known as "Program Design".

These factors are as follows:

- technical
- tactical
- physical
- psychological
- social/ancillary

The above factors should be incorporated when planning and organizing a program so the coach can help the youngsters develop basic competencies under each domain. These competencies are as follows:

Technical Domain

- eight motor skills (specifically - stance, balance, timing and coordination)
- planes of balance and movement (all planes)

Tactical Domain

- line (skis carve down the fall line with speed)
- turn shape (clean arcs - event specific)
- types of turn (fall line to full, working with terrain)
- terrain (utilize type of turn that will allow child to maximize speed)
- snow conditions (eager to explore all conditions)

Physical Domain

- develop abilities in balance and coordination
- develop cross training abilities through involvement in other sports and/or activities
- develop an understanding of the need for effective warm up

Psychological Domain

- **goal setting**
 - understands and expresses personal reasons for involvement in sport
- **emotional control factors**
 - understands breathing control techniques
 - understands positive self talk
- **attention control factors**
 - understands relaxation
- **focus/concentration**
 - listens and follows directions
 - activation control
 - understands the concept of positive self talk and breathing techniques
- **self concept**
 - understands cooperation/working in a team environment
- **imagery**
 - basic understanding of verbal or visual instruction

Ancillary Domain

- **social**
 - understands skier's responsibility code

- **safety**
 - understands the importance of stopping below the group
 - understands the buddy system

Competencies in the above areas should be the overall goal of the entry level program. All these skills can be developed with the help of the coach who exhibits good planning and creativity in program design.

Basic Competencies for 6 - 8 year olds

The entry level coach should strive to help children in this age group develop **FUN**damental skills in the technical and tactical domains. Although this age group will display certain limitations in all the areas discussed under Program Design, the coach must utilize the eagerness and willingness to participate that is inherent in all youngsters of this age, given the right circumstances. On easy to moderate terrain a 7 - 8 year old should strive to demonstrate abilities in the following domains:

Technical

- demonstrate basic athletic stance on skis
- demonstrate an ability to pattern linked parallel turns with rhythm
- demonstrate an ability to maintain weight over the outside ski
- demonstrate an ability to execute stops (both ways)

Tactical

- demonstrates an understanding of the fall line on a given slope
- demonstrates an ability to maintain speed on moderate to flat terrain
- demonstrates an ability to use a variety of turn types in working with varied terrain

Basic Competencies for 9 - 10 year olds

Physical components such as agility, balance, coordination and strength in this age group are developing due to growth and maturity factors. On intermediate terrain a 9 - 10 year old should be able to demonstrate abilities in the following domains:

Technical

- demonstrates an ability to **pattern and adapt** linked giant slalom turns with consistent shape and speed
- demonstrates an ability to **pattern** linked turns of varying radius with consistent shape and speed
- willing to test abilities on all types of snow conditions
- willing to test abilities on a variety of terrain
- demonstrate an ability to remain balanced and centered over the outside ski in the fall line
- demonstrate an ability to work legs together (symmetrical edging)
- demonstrate consistent pole action

Tactical

- demonstrates a basic understanding of skis carving down the fall line
- demonstrates a basic understanding of clean turn shape with speed
- demonstrates an ability to maximize speed on minimum terrain by adjusting turn type for terrain
- demonstrates ability to vary turn type with rhythm and loose linking

Article 4

Physical Preparation for Entry Level Children

Introduction

Physical preparation is an important part of the alpine skier's training and is of special importance for children between the ages of seven and ten, entry level in alpine skiing. Proper physical preparation provides children with an opportunity to:

- Develop fundamental motor skills in stability, locomotor, and manipulative domains through activities that promote balance, coordination and agility. These motor skills (hopping, bounding, throwing, running) must be acquired in a general sport environment before complex, sport-specific skills can be mastered.
- Develop the Five "S's" (stamina, strength, speed, suppleness, and skill) which promote on-snow skill acquisition and development.
- Develop a positive self concept, and social skills, while experiencing enjoyable, challenging situations.

In addition, proper physical preparation contributes to injury and illness prevention, an important plus.

In order for physical preparation to be effective, it must be carried out within the context of an annual plan and the activities performed must be relevant to the developmental age of the children being coached. In this article, we will explain how the above-mentioned goals of physical preparation can be achieved and illustrate how they can be incorporated into an annual action plan for the physical preparation of entry-level skiers.

Growth and Development

When planning for the physiological preparation of entry-level skiers, it is very important that the coach review the growth and development principles that relate to this age group. These principles have a profound influence on the type of activity to be taught, as well as on the method of teaching and training.

Development and Individual Differences

A skier's chronological age (age in calendar years) may be very different to his/her developmental age (as measured by ability to perform specific skills). A child's developmental age may vary by as much as two years on either side of his/her chronological age. For example, an eight year old skier could have a developmental age of anywhere between six and ten years.

As well, children grow at various rates, and even within the same gender there are wide differences in growth rates as far as strength, weight and height are concerned. In all instances, the coach should take into account the physical development and individual differences of the children he /she is coaching when choosing the components for training sessions.

While children in the *six* to ten age group differ greatly, they also share several common characteristics. These characteristics, along with the implications for the coach, are in the following table:

Characteristics	Implications for the Coach
<p>Physical Characteristics</p> <ul style="list-style-type: none"> • Hand-eye coordination and other perceptual motor skills are improving. • Large muscles are better developed than small ones. 	<p>Simple, general movement skills, such as hopping, throwing, bounding, which are the basic fundamentals of movement for all sport and games, should be the focus of coaching at this level. Activities which develop coordination and agility should also be encouraged For on-snow training, programs that emphasize the mastery of basic skiing skills should be encouraged.</p>
<ul style="list-style-type: none"> • Strength and cardiovascular endurance are increasing. 	<p>Strength, flexibility, and aerobic endurance should be emphasized, prior to learning sport specific skills.</p>
<ul style="list-style-type: none"> • Children are excitable, energetic, and responsive to rhythmic sound. 	<p>Keep children active and incorporate rhythm and soft rhythmic music into activities wherever possible.</p>
<ul style="list-style-type: none"> • Children are accident prone because their bones are not yet mature and because of their high level of activity. 	<p>Avoid situations which are unsafe or put stress on the joints (i.e., Loading of shoulders or the spine, contact games, training with weights other than their own body weight).</p>
<ul style="list-style-type: none"> • Sex differences are not yet significant within this age group. 	<p>Girls and boys may train together.</p>
<p>Cognitive Characteristics</p> <ul style="list-style-type: none"> • Interested in and beginning to understand the idea, function, and arbitrary nature of rules in games. 	<p>Games used to practice fundamental skills should have simple rules. Emphasize skill acquisition, rather than complicated strategies or tactics.</p>
<ul style="list-style-type: none"> • Attention span and reasoning ability are increasing. 	<p>Vary the games and activities used. Simple concentration exercises may be introduced.</p>
<p>Children at this age imitate what they see.</p>	<p>Demonstrate skills correctly and often (This is EXTREMELY important). Also demonstrate sportsmanship and fair play.</p>
<p>Children in this age group take things literally.</p>	<p>Give simple, precise instructions. Avoid complicated jargon.</p>
<p>Psychological Characteristics</p> <ul style="list-style-type: none"> • Children are forming a sense of right and wrong. 	<p>Children need fair, mature coaches.</p>
<ul style="list-style-type: none"> • Children are easily hurt by negative criticism • Children want to be liked and accepted by their peers. 	<p>Use humor and warmth with children and be positive and constructive. Competition and winning should be down played. Emphasize participation cooperation, "doing your best". Out of town competitions should be very limited.</p>

Development of Fundamental Movement Skills

Those involved in the physical preparation for entry level skiers should be aware that the period between *six* and ten years of age is one of the most important periods of motor development in children. It is during this time that children are developmentally ready to acquire the general, fundamental movements (such as running, hopping, bounding, jumping, and throwing) that are the basis for all sports and games. These general skills must be practiced and mastered before sport specific skills can be learned successfully.

Unfortunately, in Canada, neither the physical education system nor coaching practices at the entry level of most sports have ensured that these fundamental movements are introduced. The lack of emphasis in this area puts Canadian skiers and coaches at a certain disadvantage when compared to European skiers.

It is imperative that entry level coaches recognize and implement activities that are going to be most effective in helping children develop their fundamental movement skills. Over the long term, emphasis on fundamental movement skills will yield alpine skiers who have a better trainability for long term sport specific development. If fundamental motor skill training is not optimized between the ages of *six* and ten, the loss in motor development cannot be recaptured later.

Development of these basic movements can be achieved by having children participate in games that emphasize the development of coordination, agility and balance. Skills including throwing, running, stopping, starting, change of direction, hopping, bounding and jumping should make up a large component of the games played with children in this age group.

Coaching Hint

*It is important that these skills are learned correctly and that bad habits not be allowed to take hold. Therefore, repeated demonstration of the correct skill must be shown to the children and any errors in skill execution should be corrected immediately.

Sport equipment and rules for this age group should be modified to suit the children's physical size and capabilities, otherwise proper skill performance may be inhibited.

A number of games and exercises designed to promote acquisition of fundamental movement skills should be utilized. The coach should be sure to vary the games often and ensure maximum participation by the children. It is a good idea to encourage children in this age group to participate in a variety of complimentary sports that will develop their general movement repertoire. Involvements in gymnastics or dance are good ways to increase body awareness, agility and coordination. Soccer, figure skating, ice hockey, and swimming are other complimentary sports that will develop the child's large muscle groups, increasing strength and cardiovascular endurance.

Physical Preparation and the Role of Energy Systems

In order to perform physical work or activity, energy is needed. It is important for the alpine ski coach to understand that there are three distinct energy systems that are called upon to supply energy to our muscles when skiing, or performing any other type of physical movement.

These three systems are known as the ANAEROBIC ALACTIC, ANAEROBIC LACTIC, and THE AEROBIC ENERGY SYSTEMS. These energy systems can be trained to provide improved energy sources for the muscles used in alpine skiing, thus improving on snow performance. These energy systems are characterized as follows:

Anaerobic Alactic Energy

- requires no oxygen
- uses energy stored in muscle cells (glycogen) for fuel
- does not produce lactic acid
- main source of muscular energy for activities of lasting thirty seconds or less.

Anaerobic Lactic Energy

- requires no oxygen
- uses carbohydrate for fuel
- produces lactic acid
- main energy source for activities lasting between thirty seconds and two minutes.

Aerobic Energy

- requires oxygen to use fats and carbohydrate for fuel
- does not produce lactic acid
- main energy source for activities lasting longer than two minutes.

The energy system requirements of any given sport vary according to:

- the intensity of the activity
- the duration of the activity (work without rest)
- the relationship or ratio between work and recovery during the activity.

Generally, activities that are performed for a very short duration (under 30 seconds) at a very high intensity use the anaerobic alactic energy system.

Activities performed for between 30 seconds and two minutes at a very high intensity use call primarily on the anaerobic lactic system.

Activities performed for long periods of time at a low level of intensity, (endurance activities) are utilizing primarily the aerobic energy system.

Each sport has different energy demands and calls upon these three systems to varying degrees. For example, marathon running, road cycling, or triathlon use predominantly the aerobic energy system, while gymnastics, or jumping and throwing events in track and field are primarily anaerobic alactic events. Middle distance track events are examples of sports that use chiefly the anaerobic lactic energy system.

An understanding of the energy requirements of alpine skiing enables the entry-level coach to train the predominant energy system called upon by skiers during on-snow training. Energy

system utilization in alpine skiing has been estimated by analysing the time frame during which each ski event is performed.

In summary, it is important to develop a good aerobic base for young alpine skiers, as well as to practice activities that develop the anaerobic alactic and anaerobic lactic energy systems.

Physical Preparation – The 5 “S’s”

Performance in alpine skiing is influenced by five basic performance factors. These include:

- Stamina: endurance
- Strength: the ability to apply force
- Suppleness: flexibility; the range of motion for different joints
- Speed: agility; the ability to move rapidly
- Skill: balance and coordination

The entry level coach must be familiar with the role that each of these five factors plays in alpine skiing before he/she can plan a program of physical preparation. For the entry-level skier, all five of these factors must be developed in relation to growth and development as well as technical, on-snow improvement (skill).

The Interference Principle

Coaches must be aware that training all of the performance factors simultaneously will inhibit improvement, since these factors will interfere with each other. The only one of the Five "S's" that can be trained at the same time as another is suppleness (flexibility). If skill and strength, or skill and endurance are trained simultaneously, skill development will be inhibited. The same principle is valid when strength and endurance are trained together or emphasized in a given training phase.

Planning and Physical Preparation - Periodization

Planning the annual and long term activity of young skiers is essential. Periodization of training provides the framework for optimal physical and technical preparation by emphasizing a specific training and performance factor (from the Five "S's") while maintaining the others, thus ensuring that they don't interfere with each other. This in turn promotes improved on-snow training. Because fitness levels are developed prior to the beginning of on-snow training, a higher quality of technical training can be introduced, due to increased endurance, strength and power.

An annual plan is also useful as an evaluative tool because it provides the coach with feedback, showing how the training has affected the skier's development and helping to determine the next year's activities.

The following are definitions of terms used to describe the process of periodization:

Annual Plan

The Annual Plan is a yearly training program, consisting of several phases or periods of training. The objective of an annual training and competition plan is to provide optimum performance(s) at required time(s).

Macro Cycle

A Macro Cycle is a training period of one, two, three or four weeks (micro cycles) of progressive overloading followed by a recovery or restorative micro cycle.

Micro Cycle

A Micro Cycle is a training period of three, four, five or six days of training, followed by a recovery day.

Volume of training

Volume refers to the quantitative component of training, incorporating the intensity, duration and frequency of training.

Intensity of training

Intensity is the qualitative component of training, incorporating all training activities performed in a given unit of time.

Taper

Taper is a period of reduced training prior to a competitive performance.

Naturally, the general trends of periodization must be adapted to the specific needs of the entry level skier.

Adapting Periodization for Entry Level Skiers

At entry level in alpine skiing, the main purpose of an annual periodized plan is to encourage Fundamental skill development rather than "training to compete". Although low level competitions do take place, their importance within the annual plan is down played. Emphasis is on training to develop basic physical and technical abilities so that a good training base is established for the future.

When formulating a periodized annual plan for entry level skiers, the year may be divided into three phases or periods in which the Five "S's" of performance stamina, strength, skill, suppleness, and speed are arranged to optimize their improvement or maintenance. These phases include: the General Preparatory Phase, the Specific Preparatory Phase and the Competitive Phase. These phases differ from each other because each phase emphasizes a different aspect of training while maintaining levels of fitness in other areas.

Goals and Objectives of the Preparatory Phase of the Annual Plan

(May to July)

The aims of physical preparation during this phase is related to general physical conditioning, flexibility, cardiovascular endurance, general strength of the lower body, upper body and core, as well as general agility, balance and coordination development.

The phase is characterized by high volume and low intensity of training. In other words, there is lots of repetition of exercises, but at low intensity. For children of entry-level age, the best assurance that exercise intensity is not too high is "the talk test". Children should be able to speak without being breathless while engaging in the activity.

During the General Preparatory Phase, at least four to six training sessions per week are recommended. If the skiers train only three times per week, they will at first appear to improve their fitness level, since they are untrained. However, as their trainability improves, training three times weekly will only maintain, not improve acquired fitness levels.

If the coach and/or athletes find it difficult to schedule four sessions per week as a group, then a training program can be provided which skiers can follow on their own at home. Participation in another sport program during the week may also provide training opportunities.

Goals and Objectives of the Specific Preparatory Phase

(August to December)

During the Specific Preparatory Phase, the training objectives are twofold, to provide sport specific fitness preparation, and, towards the end of the phase, to provide optimum on-snow training before competition begins.

Flexibility training continues and cardiovascular endurance is now maintained at present levels, but no longer receives the emphasis that it did during the general phase. Strength training, as well as agility/balance/coordination training becomes more specific to alpine skiing.

Training of these factors is achieved by using hopping-bounding exercises and medicine ball exercises that simulated ski related activities and time frames (i.e., 30-40 seconds giant slalom run). The exercises are repeated as often as on-snow training runs will take place. This way the skiers will be prepared for the upcoming volume and intensity of technical, on-snow training.

A relatively lower volume of training, but with higher intensity characterizes this phase of the annual training plan. Interference between the various training sessions must be avoided. For example agility, balance and coordination must always be trained before aerobic or strength training. Training of agility, balance and coordination must never be attempted when the skiers are tired. Cumulative fatigue from prior training sessions must be avoided on an on-snow training day or on race day, because it will interfere with learning new technical skills, or with achieving optimum individual performances.

Therefore, the main objective of each training session must be decided upon and only one of the Five "S's" must be emphasized at any session while the others are maintained. An important exception to this rule is suppleness, or flexibility. Flexibility can be given priority in a training session, along with one other basic performance factor. In fact, it is important that flexibility exercises for all of the major joints of the body be conducted during the warm up, which should begin every training session.

Goals and Objectives of the Competitive Phase of the Annual Plan

(January to March)

The Competitive Period is characterized by maintenance of established fitness levels. Technical on-snow training is emphasized. The concepts of taper and peak come into play during the Competitive Phase. Taper occurs prior to a race and peak occurs (hopefully) on race day

At the entry level tapering and peaking (unloading before competitions to allow the body to recover before a peak performance) is less important than at more advance levels of competition.

To attempt to taper and peak for all the scheduled races for entry level skiers would be unrealistic. It would mean sacrificing a significant amount of training time and would not help the long-term objectives of athletic development.

A solution might be to group some competitions together in December, in January, or in February and March, and emphasize technical and fitness training in between. Between races, performance related problems can be identified and corrected. This way, both the short and the long term objectives can be met.

In summary, maintain and develop further fitness and technical skills, however avoid interference of the basic performance factors.

Periodization and Training Patterns

When drawing up an annual plan, the entry level coach can divide the year into the three phases of training and ensure that the type of training he/she sets out for each phase is within the guidelines set out above.

During each phase of training, the volume of training could be organized so that there are a variety of heavy, medium or low volume weeks. A heavy volume training week should be followed by a medium or low volume week in order to provide adequate recovery before again increasing volume. Remember that prescribing the same volume of training for long periods of time is not recommended and will be detrimental to fitness development.

Similar patterns of training could also be applied to daily training. A heavy training day should be followed by a light or medium volume day. This distribution will provide better adaptation to training and will also provide better recovery after training. Recovery from fatigue must be carefully monitored in order to allow enough time for adaptation and to avoid over training.

Sport Nutrition for Alpine Skiing

A skier's diet should consist of:

- Simple and complex carbohydrates for energy (fresh fruits, vegetables, grains, cereals, breads, pasta and beans).
- Protein for muscle growth and repair (fish, chicken, lean-cut meats).
- Low-fat dairy products for calcium and bone growth (2% milk, low-fat yogurt, low-fat cottage cheese, low-fat mozzarella cheese, polyunsaturates, margarine, etc.)

- Whole wheat grains, cereals, breads and pasta for quick muscle energy (shredded wheat cereal, hot oatmeal cereal, whole wheat muffins, breads, fresh pasta).
- Fresh fruit and vegetable for vitamin and mineral supplies (apples, oranges, bananas, broccoli, carrots, potatoes, etc.)
- Water...lots of it!

Coaching Hint: Stay away from fried foods, fast foods, processed foods, chips, cookies or too much salt, sugar or preservatives. Eat fresh foods and keep it simple!!!

Monitoring the Effects of Training

Regular monitoring and testing of the improvements of the skiers is essential. Various field tests, such as the vertical jump and standing long jump can be used to identify power development. The Leger-Boucher Shuttle Run Test can be used to determine endurance levels, while flexibility can be measured by the Sit and Reach test. Abdominal strength can be determined using sit-ups or crunches.

Conclusion

In summary, a balanced, all round program of training, which emphasizes skill acquisition and participation, is best for the growing child. The program should develop all of the basic performance factors. The entry-level ski racer should be trained in a structured program that emphasizes overall development rather than specialization within the context of a safe and fun environment.

Article 5

Mental Skills Training for Entry Level Children

Integration of mental skills training at the entry level must be recognized as important as the physical, technical and tactical aspects of skill development.

Coaches at this level should familiarize themselves with as many mental training techniques as possible in order to introduce entry level children to the processes of self awareness, self regulation and self learning.

The programs for psychological training must be as simple as possible yet convey the message that mental skills training is an integral part of the learning process and crucial to skill development.

Simplicity is the Key

Introducing youngsters to the concepts of psychological training will at the very least, help them to begin to develop an active awareness of their personal learning process and ultimately an understanding of the relationship between psychological training and proficient physical performance. The following are the key areas that a coach might introduce at this level:

- goal setting - process and definitions
- emotional control factors
- attentional control factors
- focusing/re- focusing
- imagery
- activation control
- self concept

Goal Setting

Coaches can facilitate the goal setting process by helping youngsters understand the difference between daily, short and long term goals and dream goals. He/she must ensure that the goal setting sessions are collaborative efforts. The goal setting must originate from the children and the coach acts as a facilitator ensuring that the children recognize whether the goals are realistic any or attainable.

The coach that helps children develop their abilities to express personal reasons for involvement in the sport has succeeded in accomplishing a great deal.

The youngest of children at the entry level will come to understand that goal setting activities are important.

DO NOT DICTATE - GIVE DIRECTION

Emotional and Attentional Control Factors

Introducing the idea that physical activities (effective breathing techniques) can produce psychological rewards (relaxation) to children may initially seem counter productive. By understanding the relationship between emotional and attentional control, children will eventually be able to recognize the effect that certain factors, such as negative self talk, can have a profound effect on the following:

- mood
- ability to focus
- ability to refocus
- activation
- self concept

The coach who facilitates the children's understanding of the difference between emotional and attentional control can introduce techniques and methods that will help children recognize the following:

- role of breathing techniques
- differentiate between positive/negative self talk
- what constitutes relaxation
- how to listen
- how to follow direction

Through an understanding of the preceding factors children can learn to regulate their self talk, relaxation and abilities to focus by using physical activities such as breathing as a conduit.

Imagery and focus

Imagination, when directed and guided in positive/constructive ways is the cornerstone to increasing awareness, relieving stress, maintaining emotional control and reaching goals.

Children have the incredible capacity to imagine the most amazing scenarios through creative thinking and play. Therefore, it is incumbent on the entry level coach to guide children and provide them with as many opportunities as possible to utilize their imagination. The coach must help them develop the ability to listen intently and follow directions as closely as possible. As well, he/she must help them learn to follow basic verbal and visual instructions/directions and recognize kinetic feelings when they are performing a skill.

Activation Control

Coaches can facilitate the concept of activation control to entry level children through explanation, understanding and applying control techniques. In helping children to develop activation control skills, the coach can help children learn to recognize their optimal performance level.

Self Concept

The single most important area of mental skills training at this level is to build confidence in

children so they will develop a positive self concept.

Children who exhibit a sense of confidence will participate more willingly within the group setting, will be more receptive to constructive feedback, become a more willing participant in the self learning process and will develop better life long social skills.

The entry level coach must incorporate these aspects of mental skills training in order to help children learn how to train all the domains involved in alpine ski/ski racing.

(also see CSCF publication on “Mental Training for Entry Level Children” available for download from SNOWPRO.COM)

Article 6

Nine Steps to Basic Ski Tuning

Equipment plays a tremendous role in Alpine Ski racing, and there are many factors that must be taken into consideration: Strength, experience, and ability - just to mention a few.

As a coach on hill, you will provide your athletes technical and tactical training, which so often is not effective due to improper equipment. Whether it is the boots (canting, stiffness, or fit), or the skis (kind, structure, length, torsional stiffness), it is important that you as a coach set up each individual racer with the equipment they need. The problem with many racers today is that they want top of the line equipment, which they do not have the strength, power, or skills to work with. It is important that the skis are not too long, too stiff, or too sharp and that the boots allow lateral movement and are not too stiff.

Tools for Tuning

- Good set of ski tuning vices (very important to do the job right!)
- Flat block
- Elastic for holding the brakes
- Fibertex
- Horsehair brush
- P-tex candles
- Silicon sand paper (#100 #150 #200)
- Metal scraper
- Plastic scraper
- File cleaner
- Body file
- Chrome files
- File Guide (2 degrees)
- Masking tape (1/2 inch wide)
- Straight edge
- Diamond stone (or finishing stone)
- Iron or waxer
- Wax
- Plastic wraps

Step One

Before you start to tune the skis, look at the sidewall, and the top sheet condition. There should not be any nicks or deep marks on the top edge , sidewalls as during a turn not only the edge runs in the snow, but also the sidewalls, the corner edge, and the top sheet will be dragging in the snow. If these surfaces are rough, they will interfere with the ski and slow it down. Use a file, or sandpaper to smooth out these surfaces.

Step Two

Securely place the ski in the vice. The brakes should be clearly out of the way for both the work on the base and the work on the sidewall. Look at the base for any gouges. Use a P-tex candle to

fill the base. When dripping the P-tex into the grooves, ensure that you do not drip carbon onto the base. Constantly keep the flame clean by dripping "dirty" p-tex onto an extra metal scraper. Let the P-tex cool, then scrape using a sharp metal scraper to level the repair with the base. A body file may also be used for this purpose.

Step Three

Use a straight edge to check how flat the bases are. The base should be flat. If it is not, wrap the #100 sandpaper around the flat block and sand with even strokes until the base becomes flat. It is important that while you are doing this, you keep checking with the straight edge to see how much sanding is really needed. Remember that while you are doing this process you also texture the base! Once the base is flat, use the brass brush to clean the base, this will also cut the extra fibres that are left from the sandpaper. Use the Fibertex (wrapped around the flat block) and the brass brush again and again: The more you brush and Fibertex a ski the faster the ski will get!

It is very important for the entry-level athlete to have skis which are flat, or which have a slight bevel. This will facilitate turning. If skis are checked with a true bar occasionally, then convex or concave (railed) skis will not interfere with skill development.

Step Four

To make the ski turn easier and to eliminate the "grabby" feeling that sometimes occurs, you will need to bevel the base edge. To do this, take your role of 1/2 inch masking tape and wrap 2 or 3 layer thickness around a file. Place the file almost across the ski - 90 degrees (NOTE: not 45 or 60 degrees). The file should be perpendicular to the edge. It is important that you do one edge at a time. Please note: Depending upon the location of the tape on the ski, it will change the angle of the bevel. A good trick is to mark the edge with a felt pen so that you can see how much edge you are taking off. When finished check again with a straight edge.

Step Five

Place the skis securely on the side in the vice, with the base facing away from you. To bevel and sharpen the side edge, take your file guide and with consistent strokes begin to file. It is best to pull the file towards you, rather than push the file away from you. If the skis are new and the edges are at 90 degrees, to do the first initial filing, replace the normal file with the body file. Once the edge has been taken down, finish with the regular file.

Step Six

Once you have achieved the sharpness that you want, use the polishing stone to smooth the edge off, and also to take the burrs off the edge.

Step Seven

Now you must de-tune the skis to meet the needs of the individual racer. To do this consider the ability and strength of the racer, and also the conditions of the snow. Some racers will require a short de-tune, for others they will need a longer de-tune....this will require the coach to watch the athletes ski and train. To de-tune you can use a stone, or emory cloth.

Step Eight

Once you have cleaned off all the filings and excess it is time to wax. To ensure that you "hit" the wax it is important to consider the snow temperature, the air temperature and finally the humidity of the air. It is very often that the snow temperature and the air temperature will be very different. When waxing, ensure that the iron is not too hot and loosen off the vices to allow the skis to expand with the heating of the bases. The wax should puddle on the base, but should not smoke. Allow skis to cool completely before scraping (approx 20 min).

Step Nine

Once you have scraped the skis, texture the wax using the horsehair brush. Ensure that all excess wax has been removed from the sidewall, edges, tip and tail of the ski to ensure smooth running. Place Plastic between the skis before taping or strapping.

Article 7

Equipment Selection Special Concerns for Entry Level Children

The following information will provide the entry level coach with a basic foundation for the selection of ski equipment for the entry level athlete. This information does not focus in on any specific brand, but focuses on the technical features of ski equipment that will assist the athlete in his/her development of skills, and enjoyment of the sport. All suppliers produce good product, and with some research the coach will be able to advise parents on which would be suitable for their athlete.

Realizing the amount of technology that goes into ski equipment, the following is an overview of the basics.

Ski Selection

Side cut: The difference in width of a ski between tip, waist, and the tail. The tip and the tail will be wider to help the athletes to carve by creating an arc in the snow. Slalom skis tend to have more sidecut than do Giant Slalom skis (short/quick turns vs longer turns).

Torsional flex: Twisting of the ski. This will determine the edge hold capability of the ski. A torsionally stiffer ski will increase edge hold on the ice.

Flex: The flex or stiffness of the ski chosen for the athlete will vary depending on the physical development / ability level and the speed. Entry level athletes should ski on a softer flex.

Camber: The internal arc that is built into the ski. Camber will determine the rebound energy of the ski, and the stability of the ski in conjunction with the flex. A race ski will have more / stiffer camber than an entry level ski, therefore higher performance but less forgiving.

Construction overview

Foam core: Foam injected using air pressure to achieve an inexpensive price point.

Acrylic core: Cut foam, used predominantly in French made skis. Low weight.

Hydrated core: Water injected contents of the ski under heat and pressure causing the water to evaporate, taking any air with it, resulting in a very dense core with high durability value. Used in some cap constructions.

Wood core: Wood comprises the core of the ski and adds to the durability of the ski. Changing the type of wood used will alter the stiffness and the performance characteristics of the ski. Used in all types of ski constructions.

Sandwich construction: Fibreglass and other reinforcing laminates laid on either side of the core of the ski, perpendicular to the running surface.

Torsion box construction: Fibreglass is wrapped around the core of the ski to add torsional stiffness to the ski.

Cap construction: The newest technology in ski construction. The sidewalls and top sheet are one piece in a load bearing cap construction. A load bearing cap adds to the torsional stiffness of the ski without making the ski too longitudinally stiff. Cap construction is different from a cosmetic cap that is just for cosmetic value. Core composition varies in cap technology skis.

Guidelines for Sizing

It is beneficial to go shorter rather than longer when choosing length for the entry-level athletes. A shorter ski will facilitate turning, allowing quicker progression of basic skills and definitely increasing the athletes' enjoyment of skiing.

The ski should be between the nose and the top of the forehead for entry level children. As the athlete begins to mature and grasp the skills of carving the ski, a longer length may be appropriate. Larger, heavier or more aggressive children can ski on longer skis because more ski is needed to support the forces during skiing.

Parents may want their child to ski on longer skis so they will last longer. As a coach, this issue needs to be addressed before the parents have purchased the athletes equipment.

Ski Boot Selection

General Mechanics

A distinction needs to be made with respect to performance and comfort factors in boot fitting, keeping in mind that there are 2 options in boots for the entry level athlete; rear entry and overlap design.

Overlap design has a cuff that articulates with the lower shell using a hinge at the ankle joint. This design provides performance for the entry level athlete by allowing natural ankle flexion, due to the hinged cuff of the boot. The overlap design also allows for lateral action of the lower leg, a critical factor in skill development.

Rear entry design is comprised of a single piece of plastic encompassing the foot. This design provides warmth, and is considered to offer a comfortable fit.

Boot Flex

For the entry level, a softer boot will be more effective than a stiffer boot, due to strength limitations and skill level. To determine if a boot is soft enough for the athlete in a retail store, you should be able to see the forward boot flexion happening in the upper cuff simultaneously with the lower leg. If the lower leg moves forward and the upper cuff moves very little, then the boot is too stiff. The boots should not inhibit the natural alignment of the athlete.

Boot Size

Growth of the athletes' foot during the season needs to be considered, but similar to skis, buying boots oversized is counter productive for both performance and fit. If the boot fits too large the athlete's foot can move inside the boot potentially causing bone spurs.

Alignment

If at all possible children's boots must be aligned to their lower leg. Boot cuffs that are tipped outward will place too much pressure against the inside of the leg. This will result in a child's inability to roll the legs inward and affect lateral balance and edging skills.

Footbeds

These are important factor for performance but at the entry level, footbeds **do not play an important role** due to growth and cost factors. This only becomes a concern at the K2 level.

Binding

Safety

For the entry level coach safety is the main concern in terms of bindings. All bindings currently available on the market are safe if properly adjusted by a qualified technician at a retail shop.

As an entry level coach you should NOT adjust your athlete's bindings. Leave this to qualified professionals.