

# PHYSICAL LITERACY CONCEPT PAPER

**Ages 0-12 Years**

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## Executive Summary

- The United Nations has declared 2003 – 2012 to be the International Year of Literacy
- Literacy is often thought of as including components of knowledge, understanding, thinking, communication, and application
- To be physically literate includes the ability to move with poise and confidence across a wide range of activities. It also includes competencies that are linked to the development of the whole person (e.g., physical, affective, cognitive)
- Recent definitions of physical literacy include the importance of psycho-social aspects such as motivation, social responsibility, self-esteem, and culture.
- The development of physical literacy often starts with the development of fundamental and rhythmic skills.
- The development of fundamental skills is age related, not age dependent. Hence, when teaching children to develop fundamental skills, it must be done in a manner that is developmentally appropriate and sensitive to individual needs and abilities.
- The first three years are viewed by child development specialists as the most sensitive phase for learning (Jensen, 1998). While not the *only* phase of critical brain development, this phase is extremely powerful and different from learning in later years (Gruhn, 2002). Early childhood educators have become increasingly aware that movement plays an important role in the healthy development of a young child. In particular, previous research has demonstrated that the development of rhythmic activities during this critical period of development assists in the development of coordination, language and reading, voice reproduction, intelligence, and future complex movement patterns.
- Individuals who are physically literate are able to move with proficiency across a wide variety of fundamental skills and serve as the foundation for future participation in sport specific activities.
- When teaching more complex sport specific skills, coaches and practitioners need to consider the interaction between person, task, and environmental factors.
- Important personal regulating factors often include age, growth, maturation, motor readiness, knowledge, and learner motivation. The nature of the task and how it is taught (i.e., the pedagogy) need to match these personal regulating factors to maximize learning
- By exposing participants to sport specific skills and activities prior to developing a wide variety of fundamental skills will often result in participants hitting a proficiency barrier. The result is often frustration, failure, incompetence, and a significant decline in motivation. This in turn will most often result in withdrawal from the sport and in some cases, withdrawal from physical activity in general.
- As a result, child-centered approaches to teaching skills is critical. These approaches put the needs and current abilities (or inabilities) first above the needs or requirements of the sport itself. These type of pedagogical approaches help children and youth learn the skills needed to be physically literate at a pace that is right for them and the sport system/ organization provides ample opportunities for these skills and abilities to flourish within the system/ organization.

## Background

The Canadian Sport Centre's (2006) Long Term Athlete Development Plan (LTAD) recognizes physical literacy as the foundation for developing the skills, knowledge, and attitudes needed for Canadians to lead healthy active lives. As such, there is a need to better understanding existing research behind this rationale and the pedagogy needed to help develop physically literate individuals. The following summary of the literature provides background information on physical literacy, its connection to the development of skills, and effective pedagogical practices that help facilitate the development of physical literacy.

## Literacy

Traditionally, sport and physical education has focussed upon the development of “physical” development of individuals. Although this is critical and central to professional practices, the “physical” is only one half of the term. To truly understand the term “physical literacy”, a clear understanding of literacy is needed. This section provides a brief background on understanding literacy as it relates to both the LTAD and the term “physical literacy.”.

The timing of the Long Term Athlete Development plan could not be better. In addition to the United Nations declaring 2005 as the International Year of Sport and Physical Education, the UN has also declared this to be the Literacy Decade (2003 – 2012).

- According to the United Nations Education, Scientific, and Cultural Organization (UNESCO; 2003), literacy is more than just reading and writing. It is about:
  - how we communicate in society.
  - social practices and relationships, about knowledge, language and culture.
- There are those who have suggested that the lack of a clear and concise definition of literacy has resulted in confusion around the type of actions needed in Canada to effectively impact upon literacy rates (de Castell, Luke, & MacLennan, 1981).
- Examples of literacy definitions include:
  - the ability to understand and use the standard form of communication in a particular context and for a particular purpose.” (Browne & Neil, 1991)
  - a mastery of generalizable techniques and concepts that are building blocks for future education” (Lankshear, 1998)
  - Literacy is typically viewed as falling somewhere on a continuum ranging from a set of skills to a basis for rational and ethical action (Bailey, Hunsberger, & Hayden, 1998).
- Literacy can be thought of as four key components:
  - a. Knowledge and Understanding
    - Content & comprehension of the content
  - b. Thinking
    - Use of critical and creative thinking skills and/or processes
  - c. Communication
    - Conveying of information through various forms
  - d. Application
    - Use of knowledge and skills to make connections within and between various contexts

## Physical Literacy

The foundation of the LTAD model is physical literacy. Individuals who are physically literate are more likely to have the skills, knowledge, and attitudes to be physically active across a wide range of activities. Although the concept of physical literacy is relatively new to most parents, coaches, and teachers in North America, definitions have existed for well over four decades.

One of the first written definitions was provided by Morrison (as cited in Wall & Muarry, 1994, p. 5):

“To be physically literate, one should be creative, imaginative, and clear in expressive movement, competent and efficient in utilitarian movement and inventive, versatile, and skillful in objective movement. The body is the means by which ideas and aims are carried out and, therefore, it must become both sensitive and deft.”

Recently, Margaret Whitehead has been credited as being one of the leading experts in physical literacy.

Originally, Whitehead (2001), defined a physically literate person:

- moves with poise, economy and confidence in a wide variety of physically challenging situations; and,
- is perceptive in ‘reading’ all aspects of the physical environment, anticipating movement needs or possibilities and responding appropriately to these, with intelligence and imagination.

However, recently, Whitehead (2007) has updated her definition to the following working definition:

- Physical literacy can be described as the ability and motivation to capitalise on our movement potential to make a significant contribution to the quality of life.
- As humans we all exhibit this potential, however its specific expression will be particular to the culture in which we live and the movement capacities with which we are endowed.
- An individual who is physically literate moves with poise, economy and confidence in a wide variety of physically challenging situations.
- The individual is perceptive in ‘reading’ all aspects of the physical environment, anticipating movement needs or possibilities and responding appropriately to these, with intelligence and imagination.
- A physically literate individual has a well established sense of self as embodied in the world. This together with an articulate interaction with the environment engenders positive self esteem and self confidence.

- Sensitivity to and awareness of our embodied capacities leads to fluent self expression through non-verbal communication and to perceptive and empathetic interaction with others.
- In addition the individual has the ability to identify and articulate the essential qualities that influence the effectiveness of his/her own movement performance, and has an understanding of the principles of embodied health, with respect to basic aspects such as exercise, sleep and nutrition.

Whitehead's updated working definition takes into consideration recent criticisms that her initial definition excluded the social and cultural contexts of movement (Wright & Burrows, 2006). The new working definition now includes concepts such as motivation, quality of life, imagination and self-esteem.

This re-worked definition of physical literacy is also consistent with other scholars in this area. For example Penny and Chandler (2000) offer this definition of physical literacy:

*“movement and physical literacy focuses upon the knowledge, skills and understanding that are associated with bodily awareness, development and expression, and that underpin participation, development of performance and enjoyment in and of the wide array of physical activities that feature in modern societies. There is a need to emphasize that the knowledge, skills and understanding that we refer to are not *only* physical in nature. The focus of attention is on physical development, but the complexity of that development is acknowledged. Thus, it is recognized that there are important psychological and sociological dimensions to physical development and that social and psychological skills and abilities required for this development, and for participation and performance in physical activities, need to be more explicit in curriculum design and teaching than may currently be the case.”* (pp. 80-81)

Hayden-Davies (2005) also supports the revised definition of physical literacy by suggesting that to become physically literate, “a child needs to be able to perform basic movement competencies (within their own physical capacity), apply these in a variety of situations and activities, understand how they can learn further, independently and have the internal motivation to do so.” (p. ).

In summary, it would seem that the definition of physical literacy has come full circle. The initial definition of physical literacy proposed by Morrison in 1969 adopted a more holistic perspective by acknowledging that **physical literate individuals not only move efficiently, but they also move creatively, competently and with enthusiasm**. Whitehead's revised working definition of physical literacy has adopted this perspective, and also further expanded the definition to include elements of social responsibility. Penny and Chandler (2000) have also recognized that such competent movers do not do so in isolation of their social environment. **Hence, individuals who are physically literate have the knowledge, skills, and attitudes to lead healthy lifestyles for themselves, and also assist others in acquiring these skills as well.**



## **Games Literacy**

*The following is an excerpt from Mandigo and Holt's (2004) article on Games Literacy:*

Building upon this holistic definition of physical literacy, Mandigo and Holt (2004) introduced the notion of games literacy to indicate the qualities and skills that students will acquire from experiencing high quality instruction when participating in games. They proposed that the aim of teaching games is to produce players who are games literate. Students are games literate if they (a) have knowledge and understanding that enables them to anticipate patterns of play, (b) possess technical and tactical skills to deploy appropriate and imaginative responses, and (c) are able experience positive motivational states while helping to facilitate motivation among others involved in the game. Rather than being literate in a single game, children with games literacy will be able to engage with poise, confidence, and enthusiasm in a wide range of games.

### *Knowledge and Understanding*

The primary rules associated with various games shape patterns of play. A child with games literacy knows the primary rules and understands how these rules create structural and tactical similarities (and differences) between games. This notion is closely connected to a thematic approach to teaching knowledge and rules common across games (Mandigo & Anderson, 2003; Mitchell, Oslin, & Griffin, 2003). Rather than teach the rules, skills, and tactics of one sport, the thematic approach advocates teaching students games through the use of four game categories: (a) target games, (b) striking/fielding, (c) net/wall, and (d) invasion games. Based upon a common structure (i.e., primary rules, fundamental skills, and tactical problems), teachers can collapse similar content areas into themes that represent common game components (Mitchell et al., 2003).

There are certain tactical similarities between games with similar primary rules. For example, the tactical problem of covering space is similar for all fielders in striking/fielding games. In cricket, the fielders must position themselves to cover space in an oval while in baseball the fielders must position themselves to cover space inside a diamond. For invasion games, the tactic of creating space is very similar in soccer and field hockey because many of the primary rules of the game shape similar principles of play (e.g., both games are 11 v 11, the primary objective is to put the ball in the goal, teams defend a forced-target goal). The learner who is games literate will be able to understand and apply knowledge across games within each of the thematic categories, understanding that certain tactical concepts transfer from game to game. The intended result is that students will develop games literacy across a number of sports.

We suggest that if children can learn the primary rules and tactics across games categories, they will be in a better position to anticipate the development of patterns of play. That is, following Whitehead (2001) and Maude's (2001) general conceptualization of physical literacy, children with games literacy will be able to "read the game" and anticipate the plays as they develop. Furthermore, they will be able read and understand a wide range of games rather than simply a single game.



### *Technical and Tactical Skills*

The second aspect of games literacy relates to a child possessing the necessary skills required to effectively respond to a wide range of conditions that may occur during games. We use the term skills to include both technical skills (such as passing, shooting, dribbling, etc.), and tactical skills (such as off-the-ball movement, decision-making, defensive marking, etc.). A literate games player is able to perform a broad range of these skills, knowing both *how to do* a skill as well as *when to do it* (Bunker & Thorpe, 1982). For example, in badminton a student may know how to play a drop shot, but it is also important that she knows when it is executed during the game (i.e., when the opponent is at the back of the court or on the back foot). In this case, games literacy incorporates both the technical and tactical understanding that is required to successfully respond to patterns of play that occur during a game.

### *Positive Motivational Experiences for Self and Others*

Opportunities to experience positive affective states of fun and enjoyment are fundamental reasons why children participate in games (Weiss & Ferrer-Caja, 2002). Facilitating positive motivational experiences for one's self and for others is therefore another important characteristic in the development of a literate games player. Game environments that motivate students intrinsically help in the development of positive motivational experiences for children and adolescents.

Although being intrinsically motivated on a personal level is an important part in the development of games literacy, students need to also be aware of how to help facilitate positive experiences for others. Games literacy within the affective domain should not be gained at the expense of others. Much like the other two domains where students develop the ability to "read the game" by understanding it (i.e., cognitive domain) and reacting to it competently through the execution of appropriate skills and tactical solutions (i.e., the behavioural domain), students should be able to read how other students are experiencing the game from a motivational perspective. Constructivist approaches to teaching games is one way in which students acquire the skills to help others achieve positive motivational experiences. This approach to teaching games encourages teachers to: (a) be respectful of individual differences; (b) encourage the development of problem-solving and decision-making skills; (c) encourage students to construct their own meaning from their PE experiences; and (d) encourage a positive social network in the development of students (Allison & Barrett, 2001). Using a constructivist framework to develop games literacy, a teacher could ask small groups of students to think of ways they can create space in an invasion game. Given there are a number of potential solutions to this tactical problem (e.g., short passes, shielding the object, provide support off the ball), students are also encouraged to use a democratic process where every voice in the group is heard and respected. Throughout the process, students also need to develop solutions within the rules and etiquette of the game. As a result, students are developing important moral and ethical skills about how to relate to others while at the same time helping to increase other students' sense of autonomy and competence in game environments. Literate game players, therefore, are able to read the game through their own eyes and through their peers' eyes so that everyone has an opportunity to have a positive and motivating games experience.

Mandigo, J. L., & Holt, N. L. (2004). Reading the game. Introducing the notion of games literacy. *Physical and Health Education Journal*, 70(3), 4-10.

## Stages of Skill Development

Brustad (1998) defines development as “a sequence of change that results in an increasingly organized and specialized functional capacity for an individual.” As a result, it is imperative that parents, teachers, coaches, etc., recognize that children are not miniature adults.

Development can be described as (Haywood & Getchell, 2001):

- Sequential, continuous age-related process whereby movement behaviour changes
- Development is age-related NOT age-determined
- These change are affected by both Nature & Nurture

## Early Rhythmic Movement

The first three years are viewed by child development specialists as the most sensitive phase for learning (Jensen, 1998). While not the *only* phase of critical brain development, this phase is extremely powerful and different from learning in later years (Gruhn, 2002). Early childhood educators have become increasingly aware that movement plays an important role in the healthy development of a young child. During movement activities children use multiple sensory modalities, thus creating neural connections across numerous pathways in the brain (Council of Physical Education for Children, 2000).

As early as 1938, Susan Isaacs pioneered the significance of rhythmic activity in children’s development and summarized its role as an impulse to growth, as a means of developing movement skills through repetition and while providing a form of pleasure.

The Council on Physical Education for Children (2000) encourage teachers to engage young children in rhythmical experiences and dance. A quality movement program would include a variety of rhythmical, expressive, creative and culturally appropriate dance experiences designed with the *whole child* in mind. This implies that children’s diverse interests and abilities are stimulated and facilitated so that children use their imaginations and to move to the rhythms of various stimuli. The stimuli may take the form of rhythmical movements such as walking or skipping, singing, word repetition, poetry and using percussion instruments to create a rhythm.

For the preschooler, musical activities which incorporate both movement and music in singing games and dance activities are potentially extremely enjoyable, providing for group work, fun and humour as well as rewarding musical experiences and skill development (Overy, Nicolson, Fawcett & Clarke, 2003).

Rhythmic literacy is the ability is the ability to observe, control and differentiate the rhythm of an action according to the environmental demands in a particular situation. This enables the quick motor adjustment of the performer in an unpredictable environment, assuring success in performance (Martin, 1988).

Rhythmic literacy involves auditory, kinaesthetic, tactual and visual stimuli. These are interrelated and dependent upon one another. Music and movement education emphasizes the

significance of rhythmic ability in the execution of motor skills. Rhythmic ability refers to the understanding, memorization and movement presentation from the data from the temporal-dynamic structure and modulates the execution of the movement (Martin, 1988). It determines the level of motor skills acquisition (Frey, 1977; Hirtz, 1985; Martin, 1988) and is considered an important factor in the development, execution and learning of motor skills (Thomas & Moon, 1976). Weikart (1989) stated that rhythmic ability is acquired through participation in movement activities that require accurate response to rhythmic stimuli. Her rhythmic training technique emphasizes the use of a hierarchy of movements with younger children beginning with non-locomotor tasks and progressing to integrated movement that includes locomotor tasks. The activities consist of saying the beat without movement, tapping (non-locomotor skills), and walking (gross locomotor skills) according to the beat.

The music educator C. Orff (Keetman, 1974) based his music and movement method on the interrelationships amongst music, movement, and speech with rhythm as common concept. Walking, skipping, running, hopping, and jumping can all be expressed through specific rhythmic motives. Children can match their movements to the rhythms produced by the teacher through a tambourine. The teacher might also ask children to move and then match the rhythm of a tambourine to their movement.

Dalcroze (1980) developed a music-movement education approach, called 'eurhythmics', which is based on the premise that the source of rhythm is found in the human body and the child should draw upon these organic rhythms to develop movement sequences. In this method, opportunities for the development of rhythm occur through the form of improvisatory exercises. Dalcroze's teachers improvise rhythmic elements and children are instructed to use natural body movements to respond to musical suggestions (follow) or make independent decisions (lead). Other exercises termed 'quick reaction games' are incorporated to encourage children to demonstrate a physical response to a predetermined musical stimulus.

Many physical education programs have been enriched by music and other forms of accompaniment in an attempt to make practice more effective (Brown, Sherrill, & Gench, 1981) with various results. Previous researchers (e.g., Anshel & Marisi, 1978; Beisman, 1967) reported positive results in performance accuracy and endurance when music was rhythmically synchronized with motor performance. Painter (1966) found that rhythmic accompaniment enhanced fundamental motor skills' learning and improved children's perceptual motor abilities. In a study by Beisman (1967) rhythmic accompaniment was employed as a teaching technique for elementary school children and produced greater improvement in the performance of fundamental motor skills than teaching and practice without rhythmic accompaniment.

Derri, Tsapakidou, Zachopoulou, and Kioumourtoglou (2001) concluded that a:  
“music and movement program can produce significant gains in the quality of more complex fundamental locomotor skills. Knowing the components of the mature motor pattern of each fundamental locomotor motor skill and the level of the children, the physical educator can adjust instruction to help them develop these skills and proceed to the next developmental phase where motor skills are refined, combined and elaborated upon for use in more demanding environmental situations.” (p. 24)

Results of movement programs for young children have demonstrated positive results for the whole child. These have included:

- Hanes (2002) found associations between rhythmic repetitions and coordination activities, language and reading in 4 -6 year old children.
- Gruhn (2002) reported a strong interaction between movement (flow of movement and motor coordination) and voice production (vocalization of tone and rhythm patterns) in one and 2 year olds. Results indicate a significant interaction within different areas of motor control and intonation and pitch.
- Howard Gardner (2000) writes of the eight forms of intelligence, two of which are kinaesthetic intelligence and spatial intelligence, both utilized in movement activities.
- Derri, Tsapakidou, Zachopoulou, and Kioumourtzoglou (2001) investigated the effects of a 10 week music and movement program on children of ages 4 to 6 and concluded that a music and movement program can improve significantly the quality of particular, more complex motor skills.
- Free play seems unable to guarantee significant development of more complex locomotor skills which appear relatively late in children's motor behaviour. (Derri, Tsapakidou, Zachopoulou, & Kioumourtzoglou (2001)

## Fundamental Skills

The development of fundamental movement skills is the basic building block for the overall development of physical literacy. Much like learning the alphabet and phonics are the fundamental skills needed to eventually read Shakespeare, or identifying numbers and learning to add and subtract are the fundamental skills needed to eventually balance a cheque-book, the development of fundamental motor skills is critical if children are to apply these skills within and/or across a number of sporting activities. Previous research has demonstrated that without the development of these fundamental skills, many children and youth choose to withdraw from sport and turn to more inactive and/or unhealthy choices during their leisure time (e.g. Burton & Martens, 1986; Skard & Vaglum, 1989).

A number of definitions of fundamental skills have been provided throughout the literature.

- Fundamental skills are basic skills that are an organized series of movements using two or more body segments to accomplish a particular task, and which emphasize process over produce (Haywood & Getchell, 2001)
- A common motor activity with specific movement patterns ... which form the foundation for more advanced and specific movement activities (Gabbard, 2000, p. 253)
- Organized series of basic movements that involve the combination of movement patterns of two or more body segments (Gallahue & Ozmun, 2003, p. 52)
- Form the foundation of human development (Pangrazi, 2001, p. 313)

Although the development of fundamental skills is age related, it is not age dependent. Often, the development of fundamental skills prior to puberty is influenced by a combination of environmental factors. For example, in a meta-analysis examining gender differences in children's motor performance, Thomas and French (1985) reported that boys tended to out-perform girls prior to puberty in the development of skills such as throwing, catching, and locomotor skills involving power (e.g., sprinting and long-jump) because of more encouragement

and opportunities provided by adults. There were no biological explanations for gender differences prior to puberty.

## ***The Development of Fundamental Skills***

Fundamental skills are typically broken down into three movement categories: a) stability; b) locomotor; and c) manipulative. Following a developmental sequence, stability skills are typically taught first followed by locomotor skills and finally manipulative skills.

### **Stability**

The ability to sense a shift in the relationship of the body parts that alter one's balance, as well as the ability to adjust rapidly and accurately for these changes with the appropriate compensating movements (Gallahue & Ozmun, 2003, p. 417)

**Table 1. Summary of fundamental skills under the stability category**

Skill	Definition	Reference
Body Rolling	Body moves through space around its own axis while momentarily inverted (Gallahue & Ozmun, 2003, p. 426)	3, 5, 12
Dodging	Fundamental stability pattern that combines the locomotor movements of sliding with rapid changes in direction (Gallahue & Ozmun, 1998, p. 218)	1,3, 5, 6, 8, 9
Balancing	Keeping the body's centre of gravity above its base of support ((Hastie & Martin, 2006, p. 224)	3, 5, 6, 7, 8, 10, 12
Bending	Flexing any or all body parts (Kovar et al., 2004, p. 55)	5, 6, 8, 9
Stretching	Extending body parts (Kovar et al., 2004, p. 55)	5, 6, 7, 8, 9, 10
Twisting	Rotating body parts in opposite direction (Kovar et al., 2004, p. 55)	5, 6, 7, 8, 9, 10
Turning	Rotating the body around an axis (Kovar et al., 2004, p. 55)	5, 6, 8, 9, 10
Swinging	Keeping the axis of support above moving body parts (Kovar et al., 2004, p. 56)	5, 7, 9, 10
Stopping	Body comes to rest in a balanced and stable position.	5, 9
Rocking	Centre of gravity is fluidly transferred from one body part to another (Pangrazi, 2001)	6, 10
Push	Directing a force or object away from the base of support (Kovar et al., 2004, p. 56)	8, 9, 10
Pull	Directing a force or object toward the body (Kovar et al., 2004, p. 56)	8, 9
Rise/Stretch	Moving the body or any parts of it to a high level (Kovar et al., 2004, p. 56)	8
Collapse	Gradually relaxing the body or any parts of it in a controlled way while moving to a lower level (Kovar et al., 2004, p. 56)	8
Sway	Keeping the axis of support below the moving parts (Kovar et al., 2004, p. 56)	8
Spin	Totally rotating the body on one body part on the spot (Kovar et al., 2004, p. 56)	8
Shake	Moving with vibration (Kovar et al., 2004, p. 56)	8

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## Locomotor Skills

This category of skills involves movements that are responsible for transporting the body from one place to another

**Table 2. Summary of fundamental skills under the locomotor category**

Skill	Definition	Reference
Walking	a period of double support (when both feet are on the ground) followed by a period of single support (Haywood & Getchell, 2001, p. 121)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Running	a period of single support followed by a period of flight (limbs off ground). (Haywood & Getchell, 2001, p.125)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Jumping (vertical & horizontal)	Individuals propel themselves off the ground with one or two feet, then land on two feet. (Haywood & Getchell, 2001, 129)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Hopping	individuals propel themselves off the ground with one foot and land on the same foot. (Haywood & Getchell, 2001, 129)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Galloping	Forward step followed by a leap onto the trailing foot (Payne & Isaacs, 2002, p. 319)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Sliding	sideways step on one foot, leap on other (Haywood & Getchell, 2001, 139)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Skipping	Alternating step-hops on one foot, then the other (Haywood & Getchell, 2001, 139)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Leaping	Transference of weight from one foot to the other, but the loss of contact with the surface is sustained, with greater elevation and distance covered in the run (Gallahue & Ozmun, 1998, p. 232)	1, 3, 5, 6, 7, 8, 9, 10, 11, 12
Chasing	Traveling quickly to overtake or tag a fleeing person (Hastie & Martin, 2006, p. 205)	1, 6, 10, 12
Climbing	Ascending and descending movement using hands and feet (Gabbard, 2000, p. 285)	4, 5, 7
Fleeing	Traveling quickly away from a pursuing person or object (Hastie & Martin, 2006, p. 205)	6, 10, 12

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11. Haywood, K. M., & Getchell, N. (2001). *Lifespan motor development* (3<sup>rd</sup> Ed.).
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## Manipulative Skills

This category of skills involves movements that are responsible for either sending away, receiving, or traveling with an object such as a ball, puck, or disc.

**Table 3. Summary of fundamental skills under the manipulative category**

Skill	Definition	Reference
Underhand Throw/Roll	Using an underarm action to project an object	1, 3, 5, 6, 7, 8, 12
Overhand throw	Using an over-arm action to project an object	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Catching	The action of bringing an airborne object under control by using the hands and arms (Payne & Isaacs, 2002, p. 340)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Kicking	A form of striking where the foot is used to give impetus to a ball (Payne & Isaacs, 2002, p. 352)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Striking	A designated body part or some implement is used to project an object (Payne & Isaacs, 2002, p. 349)	1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12
Punting	A skill which requires one to kick an airborne ball with the foot (Payne & Isaacs, 2002, p. 356)	1, 3, 5, 6, 8, 11, 12
Dribble with feet	The ability to maintain possession of a ball with foot	1, 4, 6, 7, 8, 9, 12
Dribble with hands	Sustained bouncing of a ball with one hand.	1, 3, 5, 6, 7, 8, 9, 12
Volleying	Involves intercepting a downward-moving object with the hands and imparting force to that object in a manner that moves it onward in the desired direction (Gallahue & Ozmun, 2003, p. 532)	1, 3, 5, 6, 8, 12
Trapping	The ability to stop the ball without using hands or arms (Gallahue & Ozmun, 1998, p. 244)	3, 5

1. Buschner, C. A. (1994). *Teaching children movement concepts and skills*. Champaign, IL: Human Kinetics.
2. Payne, V. G., & Isaacs, L. D. (2002). *Human motor development* (5<sup>th</sup> Ed.). Boston: McGraw Hill.
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11. Haywood, K. M., & Getchell, N. (2001). *Lifespan motor development* (3<sup>rd</sup> Ed.).
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## Stages of Fundamental Skill Development

Within the various categories, there is typically a developmental progression amongst the skills within each category and between the categories of skill development. For example, children must master certain stability skills before they can progress onto locomotor skills while stability and locomotor skills often develop earlier than manipulative skills due to gross motor skills developing before fine motor skills.

Individuals learn skills in progression. Often, children will start off with a rudimentary form of a skill. Given that children are not miniature adults, progression through the stages of skill development needs to take into consideration both an individual's biological make-up and their previous experience. For example, when learning the overhand throw, pre-school children will often have difficulty coordinating their body parts in a manner that would produce a mature, or the most advanced, pattern for this throw. The ability to take steps to develop momentum, coordinate axial rotation of the hips, and sequence movement to form an efficient kinetic chain to accurately throw a ball for distance is developmentally inappropriate to expect from a two year old who is just entering the fundamental skill stage.



As a result, skill acquisition is often broken down into sequential pattern or stages of skill development. Although the terminology is often different amongst experts in motor development, there is consensus that skills are developed in a sequential manner from basic rudimentary forms to efficient and mature patterns of a skill.

The progression through the various stages of skill development is often a factor of biological readiness to learn the skill, the environmental factors that facilitate the development of the skill, and the type of tasks that individuals use to practice the development of a skill. For example, teaching a five-year old to use an overhand throw for accuracy by asking him/her to stand 10 meters away and throw a regulation size softball to a small target is a developmentally inappropriate task. Giving him/her a smaller ball, standing him/her closer to a larger target will result in not only more success, but the opportunity to teach better skill proficiency. This type of approach to fostering effective skill progression is supported by Gallahue and Ozmun's (2001) assessment of the following significant factors that contribute to fostering successful development of fundamental skills for children:

- Quality instruction
- Opportunities for practice
- Encouragement
- Environmental setting

An example of this complex interaction is often seen in helping to understand gender differences. Although previous research has found that boys and girls differ with respect to proficiency in certain skills typically classified as "feminine" (e.g., skipping) or "masculine" (e.g., throwing), the majority of this research attributes gender differences during pre-adolescence to social and environmental factors as opposed to biological factors (McKenzie, Sallis, Broyles, Zive, Nader, Berry, & Brennan, 2002; O'Reilly, Romanow, Rutledge, Covey, & Mandigo, 1999; Thomas, 2000; Thomas & French, 1985). Hence, boys and girls should be given the same opportunities to develop their skill repertoire across a wide range of activities.

### ***Phases of Fundamental Skill Development***

Individuals progress through the various stages of a fundamental skill (i.e., going from rudimentary to mature form of a skill) by becoming more proficient and efficient at performing the skill. Movement through a fundamental skill can be broken down into three key phases:

- a) Preparation phase
- b) Execution phase
- c) Follow-through phase

In the Preparation Phase, the body readies itself to initiate movement. For example, in the mature form of a striking skill such as batting a ball, an individual will prepare his/her body in such a way that he/she is standing sideways towards the thrower, bat is held with dominant hand on top of the other hand (i.e., right handed batter has right hand on top of left), weight is on the back foot, and batter is watching the pitcher.

During the Execution Phase, the body generates enough momentum to effectively and efficiently implement the skill. Keeping with the striking example, after the ball has been thrown, the batter

would keep his/her eye on the ball, transfer their weight from the back to front foot, rotate the hips, and swing the bat from the shoulders while extending his/her arms in front of the body in order to make contact with the ball.

The Follow-Through phase of a skill begins after the body has executed the skill and needs to start the process of decelerating the movement. For example, after striking the ball, the batter would continue with the natural progression of the swing with his/her arms and hips through their full range of motion and start to transfer body weight back to the back foot in order to maintain balance.

## ***Teaching Fundamental Skills for Success***

When teaching children fundamental skills, there are a number of important strategies to remember:

- a) Children are not miniature adults and therefore should not be expected to perform the mature pattern of a skill right away. Try to identify at what stage of skill development they are at initially and then work towards gradually progressing towards the next stage.
- b) Teach the entire skill (i.e., preparation, execution, follow-through) and use cues that are developmentally appropriate and to which learners can relate. For example, in the overhand throw, as opposed to saying “Use a contra-lateral stepping motion during your skill execution and follow-through after releasing the ball”, useful and succinct cues such as “scratch your opposite knee” remind the learner in a clear and more formative way to step with their non-throwing hand and to follow-through after releasing the ball. Here is an example of the steps commonly used to assess children’s skills (Gallahue & Donnelly, 2003):
  - Step 1: Observe the complete skill
  - Step 2: Analyze each phase and its key elements
  - Step 3: Use your knowledge of mechanics in your analysis
  - Step 4: Select errors to be corrected
  - Step 5: Decide on appropriate methods for correction of errors
- c) It is important to teach to the current ability level of the learner and provide formative feedback on how to improve. For example, when starting to teach catching skills, start with a larger and bright ball, throw the ball using a more horizontal trajectory, and stand relatively close to the learner. This helps the learner to not only experience success and confidence, but also helps to establish the movement pattern for more complex catches.
- d) Provide a context in which to learn skills. When using “drill-type” activities to teach skills, children will often ask “when do we get to play the game?” This may be an indication that they do not understand the relevance of the skill and how it will be used within the game or sport. Skill development does not need to be done in isolation of the sport/ game. Starting a practice/ class with a developmentally appropriate lead-up game that introduces a skill will result in children being more engaged and motivated to practice a particular skill and will also result in children being better able to transfer the skill back into the sport/ game after having had a chance to become more efficient and proficient at the skill.
- e) The development of movement skills is age related, not age dependent. Many children may be ahead or behind what is considered a “typical level” for an age group. As a result,

it is important to recognize that every child learns a skill at his/her own rate. This is a function of a variety of factors (e.g., past experience, heredity, learning style, interest and motivation, etc). Hence, it is important to be patient and provide a learning environment that is nurturing and sensitive to individual needs and abilities. For example, Garcia (1994) reported that boys and girls respond differently to skill instruction. Girls were found to interact in a cooperative, caring and sharing manner whereas boys were found to be more competitive, individual and egocentric.

- f) It is important to remember that physical literacy involves competence across a *wide variety* of skills. An individual may be very proficient at certain skills (e.g., the overhand throw and running) and be at the higher end of development, however, that same individual may also be inefficient at other skills (e.g., jumping and catching). Through the development of a wide variety of fundamental skills, more opportunities to be competent across a wide range of activities is more possible and success within more specialized activities later on is also higher due to the need to sequence movement patterns together in more complex activities (e.g., dribbling a ball while changing directions quickly in soccer requires proficiency at starting, stopping, dodging, running, and kicking a ball).
- g) Teaching to the “whole child” is critical when fostering skill development (i.e., Gallahue & Donnelly, 2003; Garcia, Garcia, Floyd, & Lawson, 2002; Wall & Murray, 1994). For example, young children can not focus on more than one idea at a time. Therefore, the amount of information conveyed to the learner needs to be minimal in order for them to process information. As well, younger children are continually looking for adult approval. Hence, providing positive and informative feedback to young children will help to promote self-confidence which in turn, helps to improve overall skill development.

## **Sport Specific Skills**

Periods of motor development are generally agreed to be reflexive/rudimentary movements in infancy, fundamental movements (i.e., basic locomotion, manipulation, and stability abilities) developed from age two to six, sports skills in childhood, and growth and refinement of skills in adolescence. Fundamental motor skills are reasonably developed in most children by age 6 or 7, although the mature patterns for some basic skills develop somewhat later (Gabbard, 2004). At this point, those who do not attain the mature pattern in various movement skills may encounter a proficiency barrier in subsequent sports-specific skills (Gallahue & Ozmun, 1998). If the fundamental motor skills have matured they can be refined and combined to form specialized movement skills (i.e., shovel pass, lay-up shot) that vary more according to the context of the environment and task.

To help to structure and justify assertions about the development of specialized (sports) skills, Bandura's (1986) social-cognitive conceptual model will be applied. The model emphasizes the interaction of person, task and environmental variables in explaining human behavior. Social-cognitive theory postulates that learning occurs in environmental contexts (i.e., peers, the teacher, and the family) through appropriately designed tasks or challenges governed by personal (i.e., cognitive and motivational) factors that are linked by interpersonal (social) engagement. Additionally, compared to a motor-program based theory of sports skill development that focuses on biological, cognitive, and conditioning parameters, a more multi-disciplinary

dynamic-patterns or systems theory (for a review, see Magill, 2004) will be followed to enable such dynamic person, task, and environment (contextual) variables to be included in any recommendations about the development of sports skills.

## ***Personal Regulating Factors***

### **Age, Growth and Maturation**

A primary regulating factor for the development of sports skills is the age, growth, and maturational status of the learner (for a review see Malina, Bouchard & Bar-Or, 2004). For example, sports skills may be underdeveloped at age ten because of limited neural capacities in the reticular formation (affecting attention span) or in the cerebral commissures of the brain (affecting integration of information). Physical (i.e., active muscle mass; growth pattern) and physiological status (i.e., muscle fibre type and biochemical characteristics regulating endurance, strength, and anaerobic power) and variations in maturational tempo (i.e., early or late physical, social, emotional, motivational ... maturation) can significantly alter capabilities for performing sports skills. Another regulating factor in the attainment of sports skills, though not as pronounced in the prepubescent as in the adolescent, is associated with gender. For example, Gabbard (2004) reports that boys perform slightly better in early childhood (more in throwing than in running or jumping), widen the gap somewhat in middle childhood, and then perform substantially better after puberty in most skills involving body support or projection in part because girls tend to plateau or regress after puberty. No sex differences in average running speed from five to eight years of age but there is after age eight. Environmental factors likely contribute to these differences. Meanwhile, prepubescent girls tend to perform better in flexibility, eye-hand motor coordination, and balance tasks than prepubescent boys.

### **Motor Readiness.**

Children can often perform motor skills they have little experience in because of general underlying motor abilities. The motor ability or movement readiness of the learner is related to sports skill achievement and is partly a function of one's previous movement experiences. Motor ability – a set of underlying traits utilized when making a motor performance – include static strength, dynamic strength, explosive strength, trunk strength, flexibility, gross body coordination, gross body equilibrium and stamina. There is more empirical support for the specificity than generality of motor abilities (Magill, 2004; Henry, 1968). Rather than having a singular, global motor ability comprised of various highly related traits, individuals likely have more many motor abilities that are relatively independent. Thus, a person who excels in a large number of physical activities will likely have numerous proficient motor abilities instead of a single proficient generalized ability. An important component of motor ability is perceptual-motor ability (i.e., multi-limb coordination, figure-ground perception, visual acuity, spatial awareness, body awareness, control precision, reaction time, speed of movement, manual dexterity, kinesthetic awareness). If such abilities are not developed by late childhood, certain sports skills may be deficient. For example, if coincident timing and visual acuity are not developed, learners may have less success at catching a pass in football or a fly ball in baseball.

Research (e.g., Allard, 1993; Ballyi, 2001; French & Nevett, 1993; Magill, 2004) has revealed characteristics that distinguish an expert motor skill performer from a non-expert. These include:

- i. deliberate (optimal and personalized) practice in a sport for at least ten years
- ii. a more conceptually organized and integrated (versus isolated facts) knowledge base of the domain (sport) and the skills
- iii. adaptability
- iv. make effective decisions
- v. are mechanically efficient (locomotion economy)
- vi. detect and correct errors better
- vii. have a rapid and efficient vision and more focused attention span that enables them to focus more strategically on key cues and patterns

As learners progress in specialized motor (sports) skills they tend to increase in the declarative and procedural knowledge, improve their detection and correction of errors, “feel” the movements more efficiently (i.e., mentally, visually, kinesthetically), monitor and control their metacognition and attention, and perform more mechanically efficient, coordinated skills.

Fitts and Posner (1967) proposed a three-phase model for learning motor skills. In the initial or “cognitive” phase of this model, participants try to pay close conscious attention to pertinent information and cues while screening out less useful competing stimuli. A major objective is to construct a clear mental picture and understand the fundamental cues of the whole (gross) skill. This initial phase of learning is usually quite rapid followed by a slowing or a plateau in progress where there may be no visible improvement. At this point, memory reorganization or consolidation of neuronal connections in the brain may be occurring or the learner may be experiencing emotional burnout (Gabbard, 2004). During such plateaus, it is important to keep children motivated and to foster pursuit of mastery (i.e., intrinsic motivating play) rather than performance (i.e., extrinsic competitive objectives) in skill development. In the intermediate or “associative” (practice) phase, the learner can generally understand and perform a rudimentary version of the skill. There is a gradual shift from concentrated thinking (i.e., a hit and miss approach) to more focused effort to refine or fixate the skill although the attention is still mainly devoted to the outcome rather than the process. The learner is able to utilize a kinesthetic “feeling” so they do not have to focus as much on the verbal or visual cues. Finally, in the automatic phase, the participant becomes able to perform the skill in a automatic, coordinated and fluid manner since they do not have to allot as much working memory and attention on each component of the skills and are able to attempt more specialized and contextualized adaptations of skills. Few children attain this third level of proficiency.

Three stages that complement Fitts and Posner’s (1967) phases are the transition, application and lifelong utilization stages (Gallahue & Ozmun, 1998). The following illustrates pedagogical guidelines for optimally developing specialized motor (sports) skills along the three phases (Adapted from Kirchner and Fishburne, 1997; Gallahue and Ozmun, 1998):

*a. Initial “Novice” Phase*

- i. Introduce clear, simple, short verbal explanations, cues, and visual demonstrations of the skill
- ii. Allow individual practice time that encourages exploration and self-discovery of the general principles of the skill.

- iii. Facilitate cognitive understanding of the general idea of the skill by focusing on a few key parts of each skill.
- iv. If possible, compare the skill to another similar and familiar skill
- v. Provide immediate, precise and appropriately positive feedback about the skill
- vi. Focus on the process (understanding of form) and not much on product (i.e., accuracy, speed, or distance).
- vii. Use practices and simple, cooperative, fun and low-organization games with few required participants and few rules.

*b. Intermediate “Practice” Phase*

- i. Provide numerous short appropriately paced practices with frequent breaks that stress quality (correct form) while increasing demands on performance objectives (i.e., speed and accuracy).
- ii. As much as possible, focus on the whole rather than the various parts of the skill. The whole method is usually superior to the part method in teaching specialized skills however, if the skill is highly complex, it is likely best to divide it into parts. Generally, the method of instruction depends on the readiness of the learner, complexity of the skill, the rate and amount of learning required (Coker, 2004).
- iii. Reinforce appropriate cues and hints in a supportive and constructive environment.
- iv. Gradually refine the skill and increase the rate of the practice activities to get to the speed and intensity of the skill for the actual competitive setting.
- v. Use small-group game-like activities that stimulate maximum participation.
- vi. Consider and allow for individual differences and provide choice to enable individuals to accommodate for them.

*c. Advanced “Automatic” Phase*

- i. Practice form, style, and accuracy in a variety of situations.
- ii. Conduct practices that are structured to promote intensity, enthusiasm, and applications of skills in varying contexts.
- iii. Teach using methods of personal autonomy support (i.e., useful positive feedback, choices).
- iv. Teach more specific technical aspects of the skills along with strategies and tactics.
- v. Utilize direct (traditional) and indirect (i.e., TGfU and Inquiry-based) instructional models to promote critical-thinking and self-regulatory capabilities in learners for application of skills according to context (i.e., competition, recreation).
- vi. Consider and train optimal self-regulation of psychological aspects of performance (i.e., mental imagery, arousal, attention, meta-cognition, goal-setting, self-efficacy, attributions, outcome expectations, mastery versus performance achievement orientations)
- vii. To facilitate continual improvement, know and adjust for each individual’s needs while encouraging creativity and adjustments (i.e., pace) especially when learners plateau.

## Knowledge.

A solid empirical case has been built concerning the important role of knowledge in sports skills and strategies. It seems that “knowledge-cognition is vital to real world skilled motor performance, it is important for formulating the intended goals of actions, and it facilitates actual performance” (Allard, 1993, p. 31). Domain knowledge consists of declarative (knowing the “what” about something), procedural (the “how” about a concept or function) and conditional knowledge (knowing “when” and “where” to apply a concept or function) (Alexander & Judy, 1988). Strategic knowledge – heuristic rules like rehearsal, organization, or goal-setting – has also been identified in movement domains like games as participants learn to appropriately apply offensive and defensive tactics like guarding or avoiding an opponent across and within game categories (invasion, net-wall, striking fielding, target) (Dodds, Griffin & Placek, 2001). Thus, sports skill-related knowledge can include declarative knowledge about movement like body and space awareness, qualities, and relationships (Gallahue & Donnelly, 2003), applying movement forms (procedural knowledge), knowing when and where to employ movement forms according to context (conditional knowledge), and knowing how to perform movements or apply tactics or rules advantageously (strategic knowledge). For example, Table 4 following summarizes generic tactical problems and solutions for net-wall games (e.g., volleyball, badminton, squash).

**Table 4. Net and Wall Game Tactics**

Tactical Complexity Levels	Generic Tactical Problem	Potential Generic Tactical Solutions	
		On-the-Ball	Off-the-Ball
1	Maintain a Rally (offensive and defensive)	<ul style="list-style-type: none"> <li>• Skill mechanics</li> <li>• Accuracy</li> </ul>	<ul style="list-style-type: none"> <li>• Positioning</li> <li>• Footwork</li> </ul>
2	Setting up for attack (offensive)	<ul style="list-style-type: none"> <li>• Shot placement to create space (corners, sides, front/back)</li> <li>• service</li> <li>• Passing &amp; setting</li> </ul>	<ul style="list-style-type: none"> <li>• Communication (doubles +)</li> </ul>
3	Defend Space (defensive)	<ul style="list-style-type: none"> <li>• Lob shot (provides time to get back into position)</li> </ul>	<ul style="list-style-type: none"> <li>• Recovery position</li> <li>• Formations (doubles +)</li> <li>• Sliding</li> </ul>
4	Win the Point (offensive)	<ul style="list-style-type: none"> <li>• shot location (e.g., at open space, at person, between partners)</li> <li>• Downward hitting (volley, spike, smash)</li> </ul>	<ul style="list-style-type: none"> <li>• body fakes</li> <li>• shot selection (e.g., power vs accuracy, spins)</li> </ul>
5	Defending against attack (defensive)	<ul style="list-style-type: none"> <li>• shot return</li> <li>• block</li> <li>• dig</li> </ul>	<ul style="list-style-type: none"> <li>• close to net</li> <li>• formations (doubles +)</li> <li>• cover (doubles +)</li> </ul>

*Compiled from Griffin, 1998; Griffin et al., 1997; Hopper & Bell, 2000; Mandigo & Anderson, 2003; Mitchell, 2001).*



Complex motor skills require performers to intentionally use and control their cognitive functions (i.e., planning, working memory, coordination, metacognition) as they interact with the environment (Wallian & Chang, 2006). Working memory and recollection of game-specific information is superior in experts. Further, compared to novices, motor experts possess greater declarative and procedural knowledge (Chi, Feltovich & Glaser, 1981) and superior cognitive processing in high-strategy sports (Allard, 1993; McPherson & Kernodle, 2003) through their superior speed and accuracy of recognizing patterns which enables them to make more strategic decisions (Thomas, French, Thomas & Gallagher, 1988). Individuals with strong motor skills seem to transition from a reliance on declarative knowledge to controlling movements using procedural (automatic, unconscious) knowledge thereby creating more space in working memory for other needs (McPherson & Kernodle, 2003). Students with superior knowledge and cognitive processing demonstrate enhanced problem resolution and performance skills in tennis (McPherson & Kernodle, 2003) and in invasion games (Nevett, Rovegno, Babiarz, & McCaughtry, 2001) such as knowing how to support teammates off the ball (Griffin, Mitchell, & Oslin, 1997).

## **Learner Motivation**

Learner motivation is another critical factor in developing sports skills. Motivational variables to consider and teach include arousal, attention, meta-cognition, goal-setting, self-efficacy, attributions, outcome expectations, mastery and performance achievement orientations, self-determination. To summarize, learners will be more prone to improving a sports skill if they have a healthy self-efficacy, self-concept, outcome expectations, and control beliefs; pre-requisite motor competencies and experiences; appropriate attention, useful and realistic goals (distal and proximal; performance and process) and goal-orientations (mastery and performance; intrinsic and extrinsic), knowledge of learning strategies, appropriate domain knowledge; constructive and accurate attitudes and emotions; helpful optimal sources of feedback; sufficient and useful resources, instructional cues, time and practice; and, a safe and affirmative social context.

Cote and Hay (2002) provide a three-stage model for sport participation from early childhood to late adolescence: Sampling, Specialization, and then either Investment or Recreational.

- i. *Sampling*: The first stage involves learners sampling a host of activities without specializing in any single sport in order to experience the enjoyment of play through sports. They cite studies reporting that children tend to drop out of sport because of “interest in other activities, lack of fun, lack of playing time, too little success, loss of motivation, dislike of the coach, overemphasis on competition and performance, and hard physical training” (p. 488). They add that play and enjoyment, were critical components of a child’s early sport experience and that the emphasis should be on “deliberate play” (developmentally purposeful) not “early specialization” or “intense training.”
- ii. *Specialization*: In the specialization years (middle childhood) the child tends to either drop-out or become more committed to and engaged in fewer sports and to more demanding and deliberate practices that need to be inherently valued and pursued in order to improve performance. Activities must remain enjoyable and play must be deliberate so learners in the specializing years “enjoy using their talent” and maintain their motivation for improving their sports skills (p. 492).

- iii. *Investment/ Recreational*: Finally, the child or adolescent might drop out, participate for recreational purposes, or choose to compete at an elite level in one or a few selected sports. The American Academy of Pediatrics recommends that children should not participate in organized sports prior to age 6 or specialize in sports prior to age 14 (and then only optionally).

## ***Task and Environmental Regulating Factors***

### **The Nature of the Task**

When designing tasks and practice sessions, it is important to consider its structure (distributed, variable, massed) and variability. Coker (2004) reports that, in general, the more the skill is practiced (correctly that is), the longer the time before it is lost. Thus, repeat and review skills repeatedly. Massed (long and few) and distributed (short and frequent) practice periods are both effective but, since children tire more quickly, short and frequent practices are probably more effective than long and gradual practices with children. It is necessary to monitor students' motivation and energy during practice sessions. Massed practice schedules are superior for learning discrete skills while distributed seem superior for learning continuous skills and for use with younger children. Thus, if not overdone, use of stations with different learning activities at each can be a useful way to foster specialized sports skills. It is also important for instructors to be familiar with the concepts of over-learning and diminishing returns (point after which practice is counter-productive. Over-learning (practicing more than is required to learn to perform a skill correctly) is ineffective in many settings since (as the point of diminishing returns is reached) too much practice can actually inhibit learning.

As participants perform game-like learning activities within four developmental levels (see the levels adopted from Gallahue & Donnelly, 2003 below) they should be confronted with tactical choices, taught to think critically about them, and learn skills through game-like activities. When teaching or coaching discrete games, Sheppard and Mandigo (2004) recommend utilizing a conceptual or thematic approach in students are taught fundamental concepts associated with game structure that they can then transfer and apply to numerous types of games. Games then become the vehicle for learning various transferable psychomotor (e.g., specialized skills), affective (e.g., social skills and cooperation), and cognitive (e.g., perceptual-motor abilities, critical-thinking, decision-making) capabilities.

**Figure 1.**



(Adopted from Gallahue and Donnelly, 2003, p. 574)

### **Pedagogical Methods.**

Although addressing all of the aspects of sound pedagogy for the development of sports skills is beyond the scope of this initiative, several critical guidelines for such pedagogy will be summarized.

- i. Teachers and coaches of specialized skills must also have sufficient understanding of the to-be-learned skills, the critical cues for teaching it, and should be aware of how difficult the skill is to perform.
- ii. Diagnosing and correcting errors in learners is another key pedagogical feature. It is prudent for teachers and coaches to equip learners with the capability to detect and correct errors themselves by providing spaced or intermittent rather than continuous feedback. In other words, feedback provided by the instructor, can be essential, not essential; an enhancement, or even detrimental for learning skills depending on the skills and learner characteristics.
- iii. While feedback for those in the early stage of sports skill development is important, it is not the most important of variables for learning. The following guidelines about providing feedback to learners of specialized skills were taken from Coker (2004):

- a) Ensure the performer has a clear understanding of the goal and that it is attainable.
- b) Provide teaching cues prior to the performance; occasional guidance (auditory or physical assistance) during performance; and feedback (i.e., videos, photos, review of cues) after the performance especially in advanced learners.
- c) The feedback must be accurate; should not be given as the person is performing; and should be given intermittently (not after every trial).
- d) Do not give feedback that is intrinsic to the task as the performer can interpret this (sensation) by him or her self.
- e) Prescriptive feedback (telling the person the error and how to correct the noted error about the performance) works best for beginners but those advanced in skills prefer descriptive statements about the performance (just telling the error) and video/computer generated visual feedback (versus auditory only).
- f) Be careful not to make learners dependent on your feedback at the expense of their self-regulation.
- g) Do not over-teach a student thereby frustrating them by overloading their working memory and overwhelming them with information they cannot process.

Instructional methods vary according to learning outcomes, context, developmental level, domain (affective, psychomotor, cognitive) priorities, assessment, and the structure, sequencing, and patterns of learning tasks (Metzler, 2000). Three instructional methods that have received considerable attention for their use in developing specialized sport skills are the direct (traditional), tactical games, and inquiry-based methods.

The most commonly used method is the direct-traditional method because it has its foundations in the historically dominant psychological learning theory known as behaviourism or conditioning. In direct-traditional instruction, the teacher or coach tends to be the supreme authority, makes most decisions, and uses mainly repetition, reward, and punishment to “condition” participants to learn. Metzler (2000) explains a more moderate direct (non-traditional) method of instructing that uses more active teaching and explicit instruction in which the instructor is more of a leader than an authority-figure is the direct-non-traditional method progressing through six steps:

- i. Review previously learned material
- ii. present new content or skills
- iii. initial student practice
- iv. give feedback and correctives
- v. provide independent practice, and
- vi. review periodically.

This form of instruction is an efficient and effective method for individuals who are avoidant, competitive, and dependent on the teacher or coach and for psychomotor developing skills in recreational activities, dances with prescribed steps, aerobics, repetitive exercises, combatives, and beginning and intermediate sports skills (Metzler, 2000). The disadvantage of this method is that it can promote superficial engagement and learning and tends to meet the needs of only certain learners.

Perhaps the most motivating method for developing specialized skills is alongside tactics, through game-like experiences, and, in particular, by utilizing indirect (constructivist) styles of teaching like the Teaching Games for Understanding (TGfU) model (Griffin & Butler, 2005; Metzler, 2000) and the Inquiry-Based Model (Hubball, 2004; Metzler, 2000). Several studies exploring ways to increase tactical knowledge and sports skills have focused on the TGfU that has been increasingly used in teaching and coaching. Tactical knowledge within the TGfU model is “knowledge in action” and consists of action rules (conditions required for efficient action), play organization rules (activity logic, dimensions, roles) and motor capacities (decisions, skills) (Grehaigine & Godbout, 1995). Among the reasons the TGfU instructional model was developed are:

- a) Participants were experiencing less success due to the heavy emphasis placed on performance (the “how”)
- b) Technique was only of limited use (application) in the game because the learners had limited knowledge *about* games
- c) While traditional teaching fostered some skill development, participants demonstrated inflexible techniques and poor decision making capacity since they were too dependent on the coach or teacher to make decisions
- d) There was little participant development as “thinking spectators” and “knowing administrators” of games.
- e) Activities and games were too repetitive year after year
- f) Children wanted to play games
- g) The more talented players were “under-challenged” and the less talented went through the motions

The TGfU instructional model fosters specialized skills and tactics by implementing a six-step process (or a modified three step process known as the Tactical Games Model) that incorporates:

- a) a motivating flow and pace (e.g., opens with an authentic game)
- b) more authentic learner-centered (e.g., include personal choice, are more personally rather than interpersonally competitive) games rather than teacher-centered “drills.”
- c) games in a simple format but progressing in complexity
- d) the development of intelligent and self-regulated performers in games
- e) inclusion by attempting to make every learner feel motivated and involved according to need
- f) optimizing challenge by individualizing task difficulty with the skill level of each participant

Metzler (2000) and others (e.g., Hubball, 2004) have postulated and tested another indirect instructional method they called inquiry-based teaching that particularly fosters cognitive understanding through group and individual problem-solving as they strive to attain psychomotor and affective outcomes. This model addresses issues that are relevant to learners, structures the practice environment to closely simulate the competitive context, and facilitates community-based (individual, team and pertinent others) initiatives for attaining objectives. The method is centered on problem-based learning opportunities that necessitate the incorporation of a wide range of learning strategies like critical thinking, interpersonal communication, goal-setting, cooperative learning, experiential learning, peer coaching, portfolios, constructive feedback, open-ended questions, and community interactions. In addition, the unique needs and ideas of each learner and ideas are considered while responsibility is facilitated by giving learners active roles, by using complex game play situations, and progressively challenging activities.

## ***Transferable Skills: The Relationship of Fundamental Skills to Participation in Sport and Recreation***

Schmidt and Young (1987) define transfer of learning as “how learning one task affects the performance capability of another task” (p. 48). In other words, transfer is concerned with how previous experience with a skill could enhance or detract from subsequent practice with that or another skill. When previous experience improves subsequent learning of another skill, it is positive transfer whereas if such experience hinders future learning of the skill, it is considered negative transfer. Negative transfer is generally temporary, happens in the early stage of learning, and occurs when an old stimulus requires a new but similar response. This means that the environmental context characteristics of two performance situations are similar, but the movement characteristics are different. Negative transfer tends to occur only when “there is a change in the spatial locations of a previously learned movement and a change in the timing of the movement” (Magill, 2004, p. 237)” Thus, if someone learns to perform a basketball lay-up outside in the sun, with little competing noise, and using a certain timing pattern – attends their first indoor practice with competing noise, more intensity, and different timing – their previous experience may hinder their learning at practice. Bilateral transfer is when learning transfers between two limbs. Bilateral transfer occurs from one limb to another although it is greater from the preferred limb to the non-preferred limb (Magill, 2004). Thus, it is best to begin practicing with a preferred limb and establish a reasonable amount of skill with it prior to practicing with the other limb.

Positive transfer is more common than negative transfer and is particularly important for the proper sequencing of skills and activities. Learners generally progress from gross motor to fine motor skills. To facilitate transfer of skills, it is useful for learners to know the similar conceptual elements of skills. Such elements could include the strategies, rules, or cues associated with the skill and knowing general pre-requisite movement concepts (special “language” of movement components like body, space, effort, and relationship awareness) and fundamental movements of the skills (Schmidt & Wrisberg, 2004). In other words, learners need a base of movement competency (i.e., pre-requisite motor ability) and a sound “movement vocabulary” of understanding what, where, how and with whom the body can and should move (Gallahue & Donnelly, 2003, p. 387). Skills are generally considered similar if they have synonymous cognitive processing demands and identical elements like skill components (coordination, rhythm, kinematics, body parts) and context (i.e., practice and game). For example, although an over-arm throw performed by a baseball pitcher and a quarterback in football may appear similar, the actual kinematics and cognitive processing involved in each may be quite different. As a result, at an advance level these skills may not have much positive transfer. Skills can also vary by the quality and quantity of the muscles they demand (gross or fine motor skills), by how much variability there is in a skill that forces learners to adapt to the dynamic features of the environment (open or closed), and by whether it has a distinct beginning and end (discrete), occurs in a sequence (serial), or is ongoing and repetitive (continuous).

A useful taxonomy for skill complexity is Gentile’s Taxonomy of Motor Skills that rates a skill into one of 16 categories based on the degree of environmental variability and the complexity of the actions (body transport and object manipulation) the skill requires. This taxonomy is useful because it helps practitioners and learners to consider the complexity of a skill and task before teaching or learning it at a particular developmental level. The most complex tasks in this

taxonomy are those that have high variability and complex actions with an object whereas the easiest are performed in a very stable environment and do not require much movement or object manipulation. For example, a less difficult sports skill could be performing a forward roll on a tumbling matt since there is no object to manipulate, little if any environmental motion or inter-trial variability, and gross body transport. Conversely, a very complex task would be fielding a football punt in a full stadium since it has complex environmental motion (i.e., fans, wind) and inter-trial variability (i.e., lighting, varying object flight, approaching tacklers), object manipulation (small oblong object), and body actions (i.e., catching while moving).

Understanding transfer is also important for practitioners trying to best structure and sequence activities for practicing sports skills or tactics. Magill (2004) reports that a general rule of thumb for deciding if positive transfer has occurred is “that the effectiveness of any practice condition should be determined only on the basis of how the practiced skill (or tactic) is performed in a ‘test’ context” (p. 234). According to Coker’s (2004) review, it is best to teach the skills as close to the actual context in which it will be performed and to begin with blocked practice schedules (one motor task is practiced repeatedly) but then progress to variable (two or more skills practiced simultaneously) and eventually to random (numerous skills practiced in variations) as the learner advances. Although blocked practices produce superior motor performance at the time of practice, variable practice creates superior learning when measured in terms of skill retention between lessons as it increases contextual interference (amount of interference created by practicing several skill variations within each practice session) and the elaborateness and distinctiveness of the memory representation of the skills that force the learner to reconstruct action plans from preceding trials of a skill. Thus, when the context for the type of practice schedule causes the learner to really concentrate on differences between motor tasks, superior learning and transfer occur.

Fundamental skills serve as the foundation for the development of future sport specific skills. For example, in a study of novice women tennis players, those who were taught the mature pattern for the overarm throw in conjunction with tennis lessons performed the tennis serve significantly better after 12 lessons over a 6 week period than those only taught service techniques (Rose & Heath, 1990). In this example, the development of a mature overhand pattern (a fundamental skill) was critical in the development of an effective tennis serve (sport specific skill).

According to Gallahue and Donnelly (2003), fundamental skills help individuals to incorporate specialized movement skills into one’s movement repertoire. If children are placed into a competitive sport environment whereby they require the use of specialized sport skills BEFORE they have fully mastered fundamental skills, they hit what is referred to as a proficiency barrier often leads to an eventual withdrawal from the sport and recreational activities.

The notion of tactical concepts being transferable between similar formal games is supported by Mitchell and Oslin (1999). In their study, students who were taught badminton using a Teaching Games for Understanding (TGfU: Bunker & Thorpe, 1982) approach not only improved their decision-making skills in badminton, but they also were able to transfer their decision-making skills to a less familiar net/wall game called pickleball (indoor tennis). These results suggest that setting up units based on game categories rather than specific sport units (e.g., soccer unit,



volleyball unit) can be an effective approach to developing games literacy across a number of formal games.

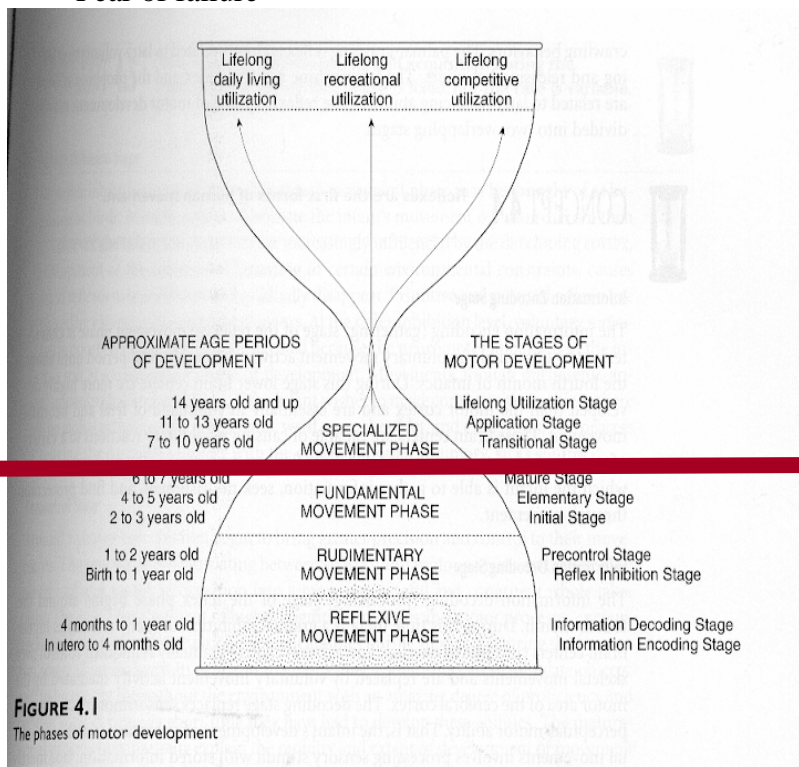
To conclude, positive transfer tends to be small and positive unless skills are almost identical, depends largely how similar the two skills are and on how well the first skill has been learned (Sharp, 1992).

## Long term impact/ consequences of moving/ not moving through the stages

Given that fundamental skills form the basic foundation for all movement patterns, not developing efficient movement patterns for these basic skills can render individuals physically illiterate and at risk of physical activity avoidance.

Gallahue and Ozmun (2001) have argued that children who fail to develop fundamental skills and who are exposed to specific sport situations often experience a proficiency barrier and are at risk of dropping out of these organized sports because they:

- Develop incorrect techniques and bad habits when it comes to efficient movement;
- Self-consciousness and embarrassment; and,
- Fear of failure



Proficiency Barrier

From Gallahue & Ozmun (1998, p. 41)

## Previous effective interventions to move children and youth through the various stages

The aim of effective pedagogy in sport within every developmental level is to promote skill development, feelings of self worth, competence and enjoyment, extend athletes' knowledge and understanding, and promote social maturity.

The following are five key pedagogical practices that can be used when teaching children and youth in sport and physical activity settings. They are based upon current research and literature pertaining to fostering the development of physically literate individuals.

### **A) Effective pedagogy is developmentally appropriate.**

The term *developmentally appropriate*, means that “the activity is of a frequency, intensity, duration and type that leads to optimal child growth and development and contributes to the development of future physically active lifestyle” (Council of Physical Education for Children, 2000, p. 6).

Developmentally appropriate movement experiences infer that the intellectual, physical and social demands placed upon the athlete and suitable for the child's stage of development. The complexity of the task and the environment (e.g., weight of objects, speed of objects, predictability of equipment and distance received from) should all be considered when constructing an age appropriate environment (Wall & Murray, 1994).

Examples of developmentally appropriate practices include:

- the equipment is age appropriate (Gagan, 2003; Gallahue & Donnelly, 2003). For example, the spread of a child's hand at 9-12 years of age averages about 19.1 cm which represents 25% of the circumference of a regular ball (Haywood, 1986). When collegiate basketball players pick up a regulation size basketball, the hand spread is about 31% of the circumference for men and 28% for women. To put this in perspective, what if we were to give an adult a larger and heavier basketball than he/she is used to and ask them to shot it into a net 2x their height - this is what we are asking children to do if we have them shoot a regular size basketball at a 10' high net. This is why we see mini-basketballs and adjustable nets
- language should be age appropriate as children are concrete rather than abstract thinkers (Council of Physical Education for Children, 2000).
- conceptual learning is fostered that allows athletes to possess the key knowledge of why we do it this way (Karp & Woods, 2003).
- The complexity of the task and the environment (e.g., weight of objects, speed of objects, predictability of equipment and distance received from) should all be considered when constructing an age appropriate environment (Wall & Murray, 1994).
- Practice should be accomplished correctly whenever possible (Wall & Murray, 1994). High intensity physical activity may have training benefits, but may reduce persistence among some children and youth if they are perceived as too difficult or boring (Council of Physical Education for Children, 2000).

## **B) Effective pedagogy is task oriented.**

Planning and organizing by the teacher/ coach are essential for effective learning (Gallahue & Donnelly, 2003; Rink, 1993; Wall & Murray, 1994)

Meaningful experiences are planned for the participant. These experiences maximize full participation by all, work towards intended outcomes in terms of movement skills. The leader then, must organize and manage the learning environment, and develop the content to be learned and experienced. (Rink, 1993, p. 175).

The movement session is task oriented with many, many opportunities to learn. Task-oriented environments support “ ... learning new skills, developing new skills, solving a problem, or understanding something more fully” (Sarrazin & Famose, 1999, p. 30).

Task-oriented environments often consist of the following characteristics:

- Time is maximized (Gagen, 2003) and there is enough equipment for all to ensure maximum participation (Gallahue & Donnelly, 2003, p. 186).
- Safety is crucial in terms of clothing, condition and size/speed of equipment, space (Council of Physical Education for Children, 2000).
- The leader should construct situations that promote good behaviour (Wall & Murray, 1994).
- Begin on time, end on time (Wall & Murray, 1994).
- Teach by objectives (Gallahue & Donnelly, 2003, p. 186)
- Review (last covered) and preview (what will be covered) (Gallahue & Donnelly, 2003, p. 186)
- Consider the context of instruction (Rink, 1993, p.183). For example, the practice situation and what is being instructed, should be considered in relation to what is demanded in the competitive situation. In other words, make the context of teaching, learning and competition all relevant.
- The practice should have variability (O’ Sullivan, 1985) so children do not become bored.
- The effective leader considers the *context of instruction* and the context into which students are being instructed, e.g., the competition (Rink, 1993, p. 183).
- The purpose of the activity must be clear to the child. If the reasons for engaging in an activity are not readily apparent or are too abstract, they are likely to disengage. Children and youth need concrete feedback and evidence of success in activity if they are to persist (Council of Physical Education for Children, 2000).

## **C) Effective pedagogy promotes success for every participant and considers the “whole child”.**

There is an obligation to maximize capabilities of every student. Only then will students gain or experience satisfaction from game participation, activity, and social interaction (Browning, Charles, & Schack, 1990). As a result, the *whole child* is considered in all experiences such that activities should enhance the motor, cognitive, emotional and social development of the individual, not merely the physical at the expense of other domains (Council of Physical Education for Children, 2000).

The following are pedagogical strategies when considering teaching to the whole child:

- The activity program is *inclusive* as it accommodates a variety of individual characteristics such as developmental status, previous movement experiences, fitness and skill levels and body size (Council of Physical Education for Children, 2000).
- Gender equity infers that both males and females be provided many positive opportunities to engage in sport, and that leaders should not reinforce the skill levels of one sex and reject those of the other. The child's perceptions of appropriate gender roles through environmental influences seem to play large parts in gender differences in motor activities. (Browning, Charles, & Schack, 1990). Thomas and French (1985) speculate that boys' superior performance often reflects more practice, rather than any biological difference with girls.
- Feelings of the participants are respected. When athletes of this age group are trained without concern for their feelings, a strong dislike for the activity may result (Council of Physical Education for Children, 2000). For example, many children take part in sport for social reasons. Therefore, establishing an environment that fosters a positive interaction with peers is important for positive affective development.
- The activity experience is most successful when a *challenge* is posed that the individuals feel they can accomplish. The opposite of a challenge is a *threat*, which is perceived to be an impossible undertaking (Council of Physical Education for Children, 2000).
- Whenever possible, individualize instruction to suit the needs and abilities of the learner. By setting the same performance standards and providing the same degree of difficulty for all children can often result in a lack of success due to boredom or anxiety (Petersen, 1992)

#### **D) Effective pedagogy is based upon effective communication.**

Effective communication implies competency in both verbal communication and through body language and gesture and is critical to help provide learners with formative feedback and clear instructions to assist them in enhancing their skills.

The following are pedagogical strategies that are important to consider when providing effective communication:

- Verbal communication should always be concise and clear (O' Sullivan, 1985) and appropriate for the age of the child. As well, good communication is founded upon active listening to understand another's point of view whereby the coach should be open to exchange of ideas (Gallahue & Donnelly, 2003, p. 180).
- Language must be age appropriate and specific to the sport. Avoid overload! (Gallahue & Donnelly, 2003).
- Use humor. Vocabulary should be clear and concise, avoiding confusing metaphors or 'sport slang' (Wall & Murray, 1994).
- Verbal cues are helpful-- called "cue words" or "summary cues" as well as verbal rehearsal (Kwak, 1993 Council of Physical Education for Children, 2000 for ages 3-5) assist in performance. For example, the adult or participant may coach; "Bend knees *now*"; "Head *up!*"
- Check athletes' understanding throughout and especially at end. Check for retention from last practice (Rauchenbach, 1994).

- Deal with issues in a problem solving way with the athletes (Noddings, 1992 in Gallahue and Donnelly, 2003, p. 222)
- Learning requires knowledge of results and knowledge of performance so that skills can be repeated or modified (Rink, 1996). Feedback may be verbal or visual, or both and should be provided as soon after the performance as possible.
- Feedback may be public or private, should focus on what *to do* rather than what *not to do* and be situated in the present or the future. For example, “Next time, bend your knees more” (Wall & Murray, 1994).
- Feedback or information about success in an activity is critical. Rather than providing quantitative information only on how fast, how far, how many, the process of being involved, doing one’s best, and participating regularly, should also be communicated. (Council of Physical Education for Children, 2000)
- After directions are given to the children, check for understanding (Gallahue & Donnelly, 2003).
- Deal with issues in a problem solving way (Noddings, 1992 as cited in Gallahue and Donnelly, 2003, p. 222)
- Rink (1996) writes that demonstrations or modelling should be accurate and that if the skill is broken down it should be demonstrated in sequence (slow motion is effective). Complex tasks will need to be seen more than one time and “cue words” may assist in skilful performance.
- A “learner model” (peer demo) is more likely to produce more cognitive processing of the skill by the learner (Rink, 1993, pp. 184-185).
- Self-talk participants were taught to verbalize pre-selected cues that match key elements of form for overhand throwing. These results indicate that instructional self-talk is an appropriate strategy for teaching and learning the overhand throw (Anderson, Vogel & Albrecht, 2000).

### ***E) Effective pedagogy is based upon thoughtful reflection and analysis.***

Reflecting upon one’s instruction is an important part of ensuring future instructional sessions are successful. Therefore, to achieve intended learning outcomes, the coach must self evaluate (Rink, 1993, p. 175). Self- assessment is critical at the end of every practice or competition. Questions such as “What went well”; “What did not go well”, “What should I remember for next time” are all important to ask at the end of an instructional session (Rink, 1993, p. 177). Asking these questions with the objectives of the instructional session and with the needs and abilities of the learner in mind should be central within any reflection and analysis.

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## **Appendix 1: Typical Characteristics and Developmental Considerations for Practitioners**

## Active Start Stage (0-6yrs)

### Physical Development

<i>Characteristics</i>	<i>Pedagogical Implications</i>
Children benefit from activity, with regular rest times. Children lack muscular endurance.	Alternate periods of intense activity with periods of a less strenuous nature.
Percentage of muscles mass is increasing; body fat is decreasing.	Activities that promote agility and flexibility are beneficial.
Energy is directed toward mastering bodily control and, to a lesser content, control of objects.	Activity without equipment is important. Fundamental movement skills should be stressed (eg. Running, jumping)
Gross motor skills are much easier than fine motor skills.	Activities that demand fine motor skills in early stages are less appropriate (eg. Tap dancing) than gross motor and non-manipulative activities.
Most can run with adult form in later stage.	Stopping, starting, dodging, changing direction, pathways and speed in running - chasing games are a favourite.
Locomotor movements are required for most age appropriate movement activities.	Rolling, jumping, hopping, leaping, skipping and galloping, presented in various ways.
Beginning of object handling. Manipulation of objects is difficult: may throw a strike (project) with some proficiency; may catch and trap (receive) with difficulty; may bounce and dribble (retain) with difficulty.	More time should be spent on non manipulative skills than manipulative skills. Throw with small balls; strike with a large bat or hand at a stationary ball. Catching and trapping is easiest when rolled or bounced with a large ball. Large balls should be used. A predictable surface, such as the wall or floor, should be used in initial development of ball skills.
Children may excel in one skill and find another difficult.	Teachers should allow for and anticipate individual differences. Skilled children should be given additional challenges; lesser skilled children should be encouraged but not under pressure.

## Cognitive Development

<i>Characteristics</i>	<i>Pedagogical Implications</i>
Children have a short attention span.	Change activities/tasks often. Directions for and duration of activities must be brief.
Amount of concentration varies. Children are prone to accidents, may forget easily, can't work alone for lengthy periods.	Children may need to be reminded of the task. Remind children of task and safety procedures.
Children always want to be involved.	Children should be as active as possible with their own equipment.
Children are eager to learn, enjoy solving problems and discovering.	Problem solving is ideal with much exploration and time to discover. Children may not respond well to complicated instructions in early stages.
Children enjoy music and rhythmic activities.	The leader may incorporate rhythmic activities such as music and movement, singing and clapping games and dances.
Children are imaginative and love dramatics.	Foster use of the imagination, creativity and dramatics.
General lack of fear exhibited by children.	Children should work within their capabilities and should be taught safety rules and procedures to prevent injuries.

## Social Development

Children are very egocentric and cooperation with a partner may be difficult.	Working alone is best for skill development or short periods of working with a partner.
Children have difficulty in seeking a team goal. Scores are not important.	Team games present a problem because the child is not always active and the child does not appreciate a "team concept". Games in which there are no teams are most effective for full engagement.
Children need approval and much praise.	Provide experiences that will challenge the child yet foster success. Give praise for quality work, good efforts and recent accomplishments.
Children are learning to share and take turns, particularly when the activity is age appropriate.	Children should not be forced to work with others.

**FUNDamentals**  
*Females 6-8, Males 6-9*  
**Physical Development**

<i>Characteristics</i>	<i>Pedagogical Implications</i>
Children need vigorous activity.	Every child should engage in maximum activity for a maximum amount of time.
There are steady gains in height and weight.	Much repetition of previously acquired skills is required in new and varied situations.
Legs are still short in relation to trunk; however legs are growing rapidly.	Much activity is needed to enhance control of the body and, to a lesser extent, control of objects.
Center of gravity is near adult location.	Repeat simple challenges requiring good balance.
Children have improved ability to focus eyes and track objects.	Manipulating objects is steadily improving. Catching, trapping with feet, dribbling with hands or feet are appropriate activities.
Children enjoy constant activity and have sudden bursts of energy.	Directions should be short; each child should have equipment.
Children are mastering or mastered most locomotor movements.	Much repetition of locomotor activities is needed.
Skill and control is developing to gross motor activities.	Repeat gross motor skills aquired; practice new gross motor skills.
Manipulative skills are slowly developing.	Extensions such as paddles, sticks and racquets are often too difficult until later stage. Batting is appropriate if the ball is stationary in early stage; hockey because of the puck's predictability.
Fine motor skills are slowly developing. Activities requiring small muscle control are difficult.	Mature form may be developed through modified equipment.
Usually, there is little difference in physique of males and females, though there may be some early maturing 9-year-olds.	Males and females should engage in activities together. They should be exposed to a wide range of activities.
Physiological growth changes occur in females from 8 to 12 and in males from 9 to 13 years of age.	Plan activities that provide for differences in physical and emotional maturity.
Distinct individual differences occur due to physical maturation and past experience.	Children need a well balanced program. Choose challenging, success-oriented activities.

## Cognitive Development

<i>Characteristics</i>	<i>Pedagogical Implications</i>
Attention span is still short.	Change activities and tasks often. Keep direction short and simple.
Children have improved reasoning powers.	Children will understand clear, short directions and explanations accompanied by a demonstration.
Children discourage easily and have a strong desire to please others.	Each child should receive positive reinforcement; children should not be singled out for negative reasons.
Children are imaginative and creative, enjoy dramatics.	Activities should foster creativity and promote problem solving to which there are many answers.
“Why?” is often asked.	Honest, simple and short answers will satisfy the child’s inquisitive nature.
Memory is improving although it may lapse.	A well planned program should provide continuity by building upon previous work. Children will require reminders, particularly about safety.
Children have a greater purpose with regard to skill acquisition; they are keen to learn new skills and master others.	Provide much time for practice with equipment in various ways, including free play and more structured activities.
Basic conceptual understanding (timing, force, open space) are developing.	Relevant concepts can be explained and explored in various ways.
Children respond well to recorded music.	Various kinds of music may motivate the children.

## Social Development

Sense of humour is not mature. Children will laugh at slapstick humour.	Sarcasm is often not understood and may be perceived as ridicule by the child.
There may be some difficulty in transitioning from individual to group play.	May prefer playing alone or with one other; teams of 2 or 3 per side may be suitable depending upon skill development. Team concepts (sharing, passing) are developing.
There is little differentiation between friends of same or other sex in early stage. Friendships shift often, particularly in girls in later stage.	Pairing is not usually a problem but sensitivity to social preferences and situations is important.
Children will recognise that some children are more skilled than others.	Program should allow for individual differences. Children should be openly praised for skill, although every child needs praise and reinforcement.
Children are usually in awe of coach and may be intimidated by coach who ‘knows all’.	Children should be free to ask questions and enjoy a warm, supportive relationship with the coach.

**Learning to Train**  
Males ages 9-12, Females 8- 11

**Physical Development**

<i>Characteristics</i>	<i>Pedagogical Implications</i>
Children need vigorous activity.	Every child should engage in maximum activity for a maximum amount of time.
Individual differences become obvious in physical stature and abilities.	Children should be able to work at their own level and progress at their own rate; coaches shouldn't 'give up' on a child.
Rapid development in strength and control of gross and fine muscles.	Complex skills are being refined and may be applied to specific sports. Judicious instruction and expectations for performance must account for individual differences.
Girls tend to be taller and heavier than boys; girls are usually more mature both physically and socially.	Girls may require extra encouragement at times to participate fully due to self-consciousness.
Flexibility may begin to decrease, especially in boys who naturally tend not to pursue activities which promote flexibility.	Leaders should encourage activities that promote flexibility.

**Cognitive Development**

<i>Characteristics</i>	<i>Pedagogical Implications</i>
Children enjoy intellectual aspects of sports and enjoy more complex concepts. Fact retention increases.	The coach can explain skills through application of basic physics, movement concepts and strategies of games. Rules become increasingly important.
Children may be more aware of their bodies' capabilities.	Coaches may discuss fitness principles and their implications for successful performance.
Children enjoy contests and competition as long as they view that winning is possible.	Small and large group competition is appropriate when children are mastering basic skills.
Some children may be highly skilled in specific sports and low skilled in others.	Additional challenges should be provided for the highly skilled. This may include the highly skilled working with others of less skill.

**Social Development**

<i>Characteristics</i>	<i>Pedagogical Implications</i>
Egocentricity decreases. Usually conforms well to authority, though children may sometimes feel conflicting responses to adult standards.	Rules and procedures should be well established and enforced. Coaches will <i>earn</i> children's respect.
Definite groups form according to age and gender; may display antagonism towards opposite sex.	Groupings for teams and social situations should be created with sensitivity.
Children seek group approval. Children are aware of group reactions and group standards.	Leaders should always be emotionally sensitive and supportive of all children, regardless of their abilities.
Role models play an important part in the child's world. These may range from well known	Role models should be incorporated and discussed when appropriate.



'heroes' to the coach.	
Children are establishing values.	Children may be easily swayed by the opinions and values of respected others. Adults must behave with maturity, fairness, and a positive demeanour.
Males and females develop separate interests. Boys may be very competitive and value high skill; girls may fluctuate in friendships and may value skill to a lesser degree.	Boys may need encouragement to play fairly and to include others; girls may need encouragement to participate fully.
Children desire to be popular and need to assert themselves.	Program should include problem solving teaching methods and provide for individual differences where all can succeed.

Adapted from Wall, J. and Murray, N. (1994).

## **Appendix 2: Annotated Bibliography**

## ***Complete Annotated Bibliography***

### ***Literacy***

Bailey, P., Hunsberger, M., & Hayden, K. A. (1998). The diverse faces of critical literacy: Only knowledge or also social action? *Alberta Journal of Educational Research*, 44, 120.

- The key questions presented in this article are: i) what does it mean to be literate? and ii) what (in)justices are done in the name of literacy? Literacy is typically viewed as falling somewhere on a continuum ranging from a set of skills to a basis for rational and ethical action. The complexities and implications of literacy are discussed through the specific examples of Information Literacy and Scientific Literacy. It is found that there are many lenses through which the literacy can be examined, and therefore an injustice is caused when maintaining a narrow view.

Browne, R. B., & Neal, A. G. (1991). The many tongues of literacy. *Journal of Popular Culture*, 25(1), 157-186.

- Literacy is presented as an important part of culture and the individual as a means of effective communication. Generally, the authors define literacy as “the ability to understand and use the standard form of communication in a particular context and for a particular purpose.” The controversies surrounding alternative literacies, apart from the standard reading and writing, are presented, focusing on the aim of education in a society that has exploded with knowledge in the 20<sup>th</sup> century. The complexity of the world brings about many challenges in communication that simply reading and writing cannot overcome.

de Castell, S., Luke, A., & MacLennan, D. (1981). On defining literacy. *Canadian Journal of Education*, 6(3), 7-18.

- It is argued that the illiteracy crisis in Canada is due to a lack of definition of literacy. Contemporary approaches to literacy are examined, specifically focusing on the two categories: technocratic and progressive. The technocratic approach is a simplified view of literacy, typically used in science and education, and attempts to measure literacy through standardized tests. Alternatively, the progressive approach is more complex, attempting to be more comprehensive, but in that endeavor fails to give any framework for literacy. Both approaches are found to have benefits and shortfalls that need to be addressed.

Gough, P. B. (1995). The New Literacy: Caveat emptor. *Journal of Research in Reading*, 18(2), 79-86.

- Literacy is explored from the perspective of the reading educator. The notion that there is now literacy and Literacy (the new literacy) is presented, examining the relationship and overlap between the two. The author views the new literacy as a different perspective of the old literacy. Literacy has been stretched over time and combined with many different adjectives, such as historical literacy and musical literacy. Some of these terms have lost the

old literacy connection with reading and writing and have become more of what the new literacy would define as a competence or knowledge of the subject. The author confesses that from his occupational standpoint he still follows the old literacy and compares each of the literacies from social, political, and relative perspectives.

Kist, W. (2000). Beginning to create the new literacy classroom: What does new literacy look like? *Journal of Adolescent & Adult Literacy*, 48, 710-718.

- An examination of the definitions of literacy from the past has led to the development of a new literacy that allows many different forms of expression. The author notes a frustration with the current lack of definition and suggests that there should be a new classroom pedagogy that incorporates a broader, yet critical literacy. Kist explains how he feels a classroom would integrate this new literacy into its curriculum, allowing for more freedom in method of expression and including both individual and collaborative opportunities.

Lankshear, C. (1998). Meanings of Literacy in contemporary educational reform proposals. *Educational Theory*, 48, 351-372.

- Dominant definitions of literacy from contemporary proposals for educational reform in North American, Britain, and Australasia are presented. The author describes the social nature and culture influences found in current literacy meanings. The constructs of literacy are discussed and some examples of general definitions for different competencies are described. In reference to school learners, the meaning of literacy is given as “a mastery of generalizable techniques and concepts that are building blocks for future education.”

Palincsar, A. S., & Ladewki, B. G. (2006). Literacy and the Learning Sciences. In R. K. Sawyer (Ed.), *The Cambridge Handbook of the Learning Sciences* (pp. 299-314). New York: Cambridge University Press.

- This chapter begins with a description of the multiple forms of literacy required to read and interpret information online. Parallels are drawn between the learning sciences and literacy communities, noting that collaboration between the two could be mutually beneficial. The term literacy is reviewed from a historical perspective, followed by the introduction of “new literacies.” The authors identify ten main principals guiding the theory of new literacy, which expands the former definition of literacy and includes Information and Communication Technologies (ICT). An in-depth discussion describes how “new literacy” includes ICT and how ICT can enhance the learning of literacy. Subsequently, the perspectives of “cultural literacy” and “critical literacy” are described, highlighting the research potential for the social influences of literacy and the ability to evaluate information sources.

Roberts, P. (2005). A framework for defining literacy. *Education Studies*, 31, 28-38.

- This paper aims to provide a framework for defining literacy and begins by describing three methods of defining words: stipulative, descriptive and programmatic. After describing each type of definition, the author suggests that attempting to find one all-encompassing

definition of literacy, which will satisfy all legitimate applications of the term, is a never-ending journey that will leave us dissatisfied. Each method of defining words is applied to literacy with some discussion surrounding the benefits and shortfalls of each.

What is literacy? (1989). *Journal of Education*, 171, 18-25.

- From a linguist's perspective, this paper attempts to define literacy. The definitions of pertinent words, such as "discourse," "acquisition," and "learning," are discussed with examples. Using this background, the author suggests that the broad sense of literacy can be defined as the "control of secondary uses of language (i.e. uses of language in secondary discourses)." This definition is followed by some examples of how literacy is acquired and suggestions for future directions of research.

## **Physical Literacy**

Dixon, E. (2005). The mind/body connection and the practice of classical ballet. *Research in Dance Education*, 6, 75-96.

- Physical literacy is briefly mentioned as a technique used by Topf in educating ballet students. Nancy Topf would educate her students about the basic physical anatomy of the human body to promote a better understanding when using ideokinetic techniques.

Gabbani, F. (2001). Physical education-physical literacy kinesthetic intelligence. *Physical & Health Education Journal*, 67(1), 2.

- Gabbani compares the crises of global illiteracy from both a reading/writing and physical perspective. The author then highlights the need for children to become physically literate by providing the tools and strategies required to be competent in physical movement. Finally, some comments are made as to what the author feels that schools must do to develop physically literate children.

Haydn-Davies, D. (2005). How does the concept of Physical Literacy relate to what is and what could be the practice of Physical Education? *British Journal of Teaching Physical Education*, 36(3), 45-48.

- The author uses the definition of "physical literacy" as presented by Whitehead (2001) in the same journal. Hadyn-Davies examines the current goals of physical education (PE) and analyses some cases studies of recent PE programs that focus on areas that are key to the promotion of physical literacy. The goals of current PE classes and quality PE are discussed, viewed through the lens of physical literacy. The author then provides some suggestions for curriculum objectives and concludes that physical literacy provides a "picture" for which physical educationalists should aim.

Kentel, J. A. (2003). Movement, the lost literacy: What Kenyan children can teach us about active play. *Physical & Health Education Journal*, 69(1), n/a.

- In Kenya, hundreds of children are observed playing in a lot. Unlike children in the West who have disappeared in a world of media, the author suggests that these children have a sense of play or movement literacy. Western cultural has transformed games into something different than play, something more organized and competitive. In the West children tend to be drawn to play without motion in video games and the Internet. On the other hand, the Kenyan children were able to develop games from anything they found (rocks, wood, coins) and played for the enjoyment and to challenge their own abilities or compete with one's self. It is noted that while these children may be underprivileged, they are very wealthy in the movement that is a part of their every day lives.

Mandigo, J. L., & Holt, N. L. (2004). Reading the game: Introducing the notion of games literacy. *Physical & Health Education Journal*, 70(3), 4-10.

Games are a major component of current physical education programs and can be used to accomplish the goals of current health promotion initiatives to foster behavioural, social, and cognitive development. Mandigo's concept of games literacy, and the student's ability to "read" games, has been inspired by the definition of physical literacy developed by Whitehead (2001). If a student is literate in games, they a) have knowledge and understanding that enables them to anticipate patterns of play, (b) possess technical and tactical skills to deploy appropriate and imaginative responses, and (c) are able to experience positive motivational states while helping to facilitate motivation among others involved in the game. Practical strategies of how to teach games literacy are provided.

Martin, A. (2006). Special PE: Physical Literacy in a Special School [Electronic Version]. *Physical Education Matters*, 1(3), 50-51. Retrieved February 22, 2007, from <http://www.physical-literacy.org.uk/specialpe.php>

- Martin describes a physical development program that he is creating at the Durants school for children of all ages with complex needs. His aim is to develop the child's ability to "read" and interpret a changing surrounding physical environment or space and produce appropriate movement and emotional responses to engage with it. This goal is described as the children becoming physically literate. The author provides some details and examples of what the program entails and highlights the importance of physical literacy as the most influential vehicle for long-term PE and development.

Maude, P. (2001). *Physical Children, Active Teaching. Investigating Physical Literacy*. Buckingham: Open University Press.

Penney, D., & Chandler, T. (2000). Physical Education: What future(s)? *Sport, Education and Society*, 5, 71-87.

- This paper attempts to determine the adequacy of current programs and where physical education (PE) should be headed. The authors suggest that the themes of PE curriculum should be: 1) movement and physical literacy, 2) physical activity, health and fitness, 3) competition and cooperation, and 4) challenge. Each theme is discussed in detail, concluding

with an analysis of where they fit in relation to each other. Suggestions are provided as to how curriculum and previous initiatives can be adapted to suit these themes.

Whitehead, M. (2001). The concept of physical literacy. *European Journal of Physical Education*, 6, 127-138.

- Directed towards professionals in the field of physical education, Whitehead makes a call for these educators to undertake the challenge of developing a definition of physical literacy, as it could be very useful to the field. The article begins with a review of Whitehead's previous research concerning physical literacy. Subsequently, the author continues with an examination of different philosophical approaches to understanding physical literacy, followed by an in-depth analysis of what the concept may or may not include. The final section reiterates that a definition of physical literacy has yet to be finalized and presents questions that Whitehead feels are important to consider.

Whitehead, M. (2005). The moving self: The concept of Physical Literacy and the development of a sense of self. Unpublished paper presented at IAPESGW Congress. Edmonton, Canada.

- In this paper Whitehead follows through the development of the physical literacy (PL) concept and the philosophical background. This leads into a discussion of self and self-concept based on the philosophical perspectives and how they relate to PL and communication with others. Whitehead suggests a move away from tradition physical education, towards a goal of physical literacy and outlines the content that would be required in such a program. Also, the author lists what methods are required and characteristics that teachers must demonstrate to successfully promote physical literacy.

Whitehead, M., & Murdoch, E. (2006). Physical Literacy and Physical Education: Conceptual mapping. Unpublished paper. Retrieved from [www.physical-literacy.org.uk/](http://www.physical-literacy.org.uk/)

- One of the most recent papers by Whitehead, this paper gives a more succinct outline of how she conceptualizes physical literacy. The implications to physical literacy to physical education are discussed, followed by an overview of what physical literacy means. Finally, the author steps through six stages of life from birth to older adult - examining the value and influence of physical literacy at each stage.

Wright, J., & Burrows, L. (2006). Re-conceiving ability in physical education: A social analysis. *Sport, Education and Society*, 11, 275-291.

- The main goal of this article is to examine how "ability" is conceptualized in physical education and in different social groups. The first two major perspectives analyzed are: 1) ability as physical capital and 2) ability as physical literacy. The authors note that in Whitehead's (2001) definition of physical literacy there is no account for the social and cultural contexts of movement. Long-term physical activity (LPA) is discussed as a reason for evaluating current physical education (PE) programs and the possible absence of

“learning.” Ability, PE programs, and LPA are all critically examined from the perspectives of gender, social class, and culture.

## **Stages of Skill Development**

Eversheim, E., & Bock, O. (2001). Evidence for processing stages in skill acquisition: A dual-task study. *Learning & Memory*, 8, 183-189. Retrieved February 23, 2007 from [www.learnmem.org/cgi/doi/10.1101/lm.39301](http://www.learnmem.org/cgi/doi/10.1101/lm.39301)

- Previously, it has been suggested that skill acquisition can be divided into distinct stages. This study aimed to examine the existence and nature of stages during skill acquisition through investigating the changes in resource demand during a dual-task paradigm. Participants acquired the sensorimotor skill of tracking a visual target while receiving reversed visual feedback. This task was performed alone, or in conjunction with one of four reaction-time tasks. Methodology is not discussed in any great detail, and no information on participant demographics is provided. However, the conclusions noted by the authors include that there was a different time course of interference for each of the reaction-time tasks, inferring that spatial attention and sensory transformation resources are in highest demand early in skill acquisition. Eversheim and Bock suggest that their findings are experimental support for the theory that stages of motor skill acquisition exist and can be defined by differing resource requirements.

Dreyfus, S. E. (2004). The five-stage model of adult skill acquisition. *Bulletin of Science, Technology & Society*, 24(3), 177-181.

- Dreyfus provides a well-laid out overview of his learning model as first published in the first chapter of his 1986 book. According to this theory, there are five stages that a learner passes through during skill acquisition: novice, advanced beginner, competent, proficient, and expert. Each of these stages are reviewed, compared, and analyzed in relation to the components (context), perspective, decision, and commitment of the situation and learner.

Fitts, P. M., & Posner, M. I. (1967). *Human Performance*. California: Wadsworth Publishing Company.

- In chapter 2, on learning and skilled performance, the authors discuss the three sequential stages of skill development, including some examples. The early or cognitive phase describes the beginner trying to understand the task and what is required. The intermediate or associative stage involves learning the responses needed and forming new patterns. This phase can last various lengths of time depending on task complexity and the extent of new subroutines required. In final or autonomous stage, the task requires less direct cognitive control and is less susceptible to interference from distracters. The authors also discuss the limits of skill improvement through practice and the influence of old skills on learning new ones.

Gallahue, D. L. (1976) *Motor Development and Movement Experiences for young children (3-7)*.



New York: John Wiley & Sons, Inc.

- Written for teachers and parents, this book aims to educate them about the stages of psychomotor development and suggests movement activities that can be beneficial at each stage. First, the role of movement in child development is discussed and an overview of the stages of development, with definitions, is provided. Next, the author presents each stage of development, emphasizing the psychomotor, cognitive, and affective components, in conjunction with self-concept development. With this foundation, the last half of the book suggests movement experiences that can be used to enhance each stage of development.

Gentile, A. M. (1972). A working model of skill acquisition with application to teaching. *Quest*, 17, 3-23.

- Gentile provides his working model concerning skill acquisition. A simple two-stage model is presented that includes: Stage I: Getting the Idea of the Movement, and Stage II: Fixation/Diversification. In the first stage the learner has a goal in mind and determines what motor pattern is required to achieve their goal. Through selective attention, the execution of a motor plan and the resulting feedback the learner attempts to produce the desired action. After one or more successful outcomes, the learner enters the second stage to attain a desired skill level. This phase differs depending on if it is an open or closed skill. The author reviews both cases and provides real-life examples. Finally, Gentile discusses the application of this model to teaching motor skills.

McPherson, I. (2005). Reflexive Learning: Stages towards wisdom with Dreyfus. *Educational Philosophy and Theory*, 37, 705-718.

- This article reflects on two stages that Dreyfus added to his 5-stage model of skill development (from novice to expert). The stages of the original model are reviewed, followed by the introduction of stages 6 and 7, Mastery and Practical Wisdom, respectively. These stages are discussed and critiqued by McPherson who comments on the philosophical connections to phronesis and ethics.

Shuell, T. J. (1990). Phases of meaningful learning. *Review of Educational Research*, 60, 531-547.

- Shuell presents an indepth review to seek out evidence suggesting that there exists stages through which learning systematically pass while learning complex, meaningful tasks. Many reports from past research are brought to light while discussing the concept of developmental stages and the procedures for identifying these phases. Theories that investigate both simple forms of learning and complex learning are presented, comparing how they all fit in comparison with one another. In conclusion Shuell presents how he conceptualizes each of three phases: initial, intermediate, and terminal, with some suggestion as to how a learner transitions between each stage.

## **Early Rhythmic Movement**

Campbell, P. S. (1991). Rhythmic movement and public school music education: Conservative and Progressive views of the formative years. *Journal of Research in Music Education*, 39, 12-22.

- Since the 19<sup>th</sup> Century, rhythmic movement had a continually increasing presence in music education. There has been a shift from studying musical theory to using music and movement to develop the child physically, socially, psychologically, and culturally, fulfilling the child's need for expression. There are confounding views of rhythmic movement in school: one side argues that creative rhythmic movement should be including in the curriculum, versus the side that deems rhythm as an inherited trait that can not be altered through education. Campbell presents the historical background of rhythm in music education and discussing the differing philosophies.

Derri, V., Tzapakidou, A., Zachopoulou, E., & Kioumourtzoglou, E. (2001). Effect of a music and movement programme on development of locomotor skills by children 4 to 6 years of age. *European Journal of Physical Education*, 6, 16-25.

- Fundamental motor skills are critical to the learning more specialized skills later in life and, as such, they are a major component of physical education classes. This team reported on the effect of a 10-week music and movement programme on the quality of locomotor skills developed by 68 children according to the Test of Gross Motor Development. The results showed a significant difference between subjects in the programme, compared to those who were not, on the galloping, leaping, horizontal jump, and skipping tasks. These findings highlight the ability for music and movement programmes to enhance the development of complex motor skills in young children.

Gallahue, D. L. (1976). *Motor Development and Movement Experiences for young children (3-7)*. New York: John Wiley & Sons, Inc.

- In Chapter 10, on using movement to enhance fundamental rhythmic abilities, Gallahue describes the role of rhythm in the lives of preschool and primary-grade children and the importance of including them in movement experiences. The connection between rhythm, music, and movement is discussed followed by an outline of the elements of rhythm. The author emphasizes the value of creativity and how it can be incorporated into and fostered through rhythmic activities. Suggestions for creative rhythmic activities are broken into two main categories: Imitative and Interpretive. Activities to enhance auditory rhythmic abilities are categorized by: Finger Plays, Nursery Rhymes and Poems, and Singing Rhymes. Each activity category lists specific objectives from a skill development standpoint.

Klentrou, P. (1998). The educational face of rhythmic gymnastics. *Journal of Physical Education, Recreation, & Dance*, 69(9), 33-55.

- A description of rhythmic gymnastics is provided, including the types of movements, apparatuses, and rules. The benefits of this type of movement are discussed with skill

development occurring in four areas: physical skills, motor abilities, cognitive abilities, and social skills. These areas of development are considered in the context of three major areas of learning rhythmic gymnastics: body management skills, apparatus management skills, and musical skills. Klentrou provides an in-depth discussion of methods that can be used to teach students rhythmic gymnastics and the associated benefits.

Lourie, R. S. (1949). The role of rhythmic patterns in childhood. *American Journal of Psychiatry*, 105, 653-660.

- This paper discusses rhythmic movements as a natural phenomenon in children. This movement is used by normal children to facilitate normal growth and development, and also by children with disabilities as an adaptation technique. The use of rhythm in expression is presented, as well as the different types of rhythm observed in children. Finally, the therapeutic possibilities of rhythm are considered.

Pollatou, E., Karadimou, K., & Gerodimos, V. (2005). Gender differences in musical aptitude, rhythmic ability and motor performance in preschool children. *Early Child Development and Care*, 165, 361-369.

- Movement activities have become integrated into preschool curricula. This study aimed to determine whether there were differences between the aptitude of boys and girls at the preschool age. Aptitude was measured using the Primary Measures of Music Audiation, High/Scope Rhythmic Competence Analysis Test, and the Gross Motor Development Test. Their conclusions showed no significant gender differences in musical aptitude and gross motor skills, however girls performed better than boys on four of the six measures of rhythmic ability. The authors suggest that more rhythmic movement opportunities should be provided to help boys overcome their performance deficit, especially since rhythm has been closely tied to more complex motor skills.

Zachopoulou, E., Derri, V., Chatzopoulou, D., & Ellinoudis, T. (2003). Application of Orff and Dalcroze activities in preschool children: Do they affect the level of rhythmic ability? *Physical Educator*, 60, 51-58.

- Previous studies have had conflicting results when investigating whether maturation has a greater effect than training on the development of rhythmic ability. Using a 10-week music and movement program based on Orff and Dalcroze principles, this team investigated the effects of training on the rhythmic skills of 72 preschool aged children. The children's rhythmic ability was measured using a variation of the High/Scope Beat Competence Analysis test. Participants in the intervention group differed from the control group (participated in free-play during meeting times) before the intervention, therefore the data was analyzed using analysis of covariance. The results indicate that there was a significant improvement in the rhythmic ability of the intervention group compared to the control group. Therefore, rhythmic ability in preschool-aged children can be trained through music and movement programs.

## **Fundamental Skills**

Avery, M. (1994). Preschool physical education. *Journal of Physical Education, Recreation and Dance*, 65(6), 37-39.

- Short article outlining the fundamental skills needed to be developed in children aged 3, 4 and 5 years old. Balancing, throwing, catching and stretching are given with specific examples of how to teach.

Burton, A. W., & Miller, D. E. (1998). *Movement skill assessment*. Champaign, IL: Human Kinetics.

- Chapter 10 specifically looks at assessing fundamental movement skills suggesting various types of assessment methods. Tables included documenting skill sequences and suggested time-frames for different ages and their development.

Gabbard, C. P. (2000). *Lifelong motor development*. Toronto: Allyn & Bacon.

- Outlines all aspects of motor behavior during early childhood (chapter 9) and during later childhood and adolescence (chapter 10). Age and sex-related motor performance changes are given, along with changes for each of the fundamental skills in depth. Recognizes physical education as a powerful source for motor skill development.

Gallahue, D. L. (1993). *Fundamental movement abilities*. Indianapolis: Brown & Benchmark.

- Chapter 11. Developmental sequence of fundamental movement sequences including suggested sequence of emergence for stability, locomotor and manipulative abilities. Developmental differences highlighted. Three types of fundamental movement are given a great amount of detail, using tables and diagrams.

Gallahue, D. L., & F. C. Donnelly. (2003). *Developmental physical education for all children*. Champaign, IL: Human Kinetics.

- Chapters 2, 3, 16, 18, 19 and 20. All relating to motor development, skill acquisition, movement concepts and various fundamental skills in depth. Some repetition from Gallahue & Ozmun, however, updated version.

Gallahue, D. L., & Ozmun, J. C. (1998). *Understanding motor development*. WCB: McGraw-Hill.

- Section three (chapters 10, 11, 12, 13 and 14) is an in-depth overview of childhood growth and development, including fundamental movement abilities and each of the three domains as they relate to development.

Garcia, C. (1994). Gender differences in young children's interactions when learning fundamental movement skills. *Research Quarterly for Exercise and Sport*, 65(3), 213-225.

- Investigates how young people interact in the context of learning fundamental skills using fieldwork methods over a six-month period. Girls were found to interact in a cooperative, caring and sharing manner whereas boys were found to be more competitive, individual and egocentric. Aspects of the social environment that may need to be considered when teaching motor skills to young children.

Garcia, C., Garcia, L., Floyd, J., & Lawson, J. (2002). Improving public health through early childhood movement programs. *Journal of Physical Education, Recreation & Dance*, 73(1), 27-53.

- Preschool age. Explains the benefits of movement programs with regards to fundamental movement skills and healthy lifestyles whilst also learning both cognitive and psychosocial concepts. Provides techniques and approaches that physical educators can use to provide children with positive, developmentally appropriate experiences with the ABCs of movement skills.

Get Skilled: Get active (2000). *Primary Educator*, 6(2).

- Outlines a K-6 resource regarding the twelve fundamental skills. A brief overview of what the twelve main fundamental skills are, when they should be introduced, how they are developed and why they are considered important.

National Association for Sport and Physical Education (2003). *Guidelines for Appropriate Physical Activity for Elementary school children: 2003 update*. Accessed March 25, 2007 from: [http://www.aahperd.org/NASPE/pdf\\_files/input\\_activity.pdf](http://www.aahperd.org/NASPE/pdf_files/input_activity.pdf)

- Used in most articles relating to fundamental movement skills. Overview of provisions that should be made for children in physical education but little regarding motor skills themselves.

Haywood, K. M. & Getchell, N. (2001). *Life span motor development*. Champaign, IL: Human Kinetics.

- A varied approach. Chapters 6, 7, 8 & 9 use the different classifications of skills (stability, locomotion, ballistic skills and manipulation) as their focus and the development changes that occur within these skill groups are provided within.

Ignico, A. A. (1991). Effects of a competency-based instruction on kindergarten children's gross motor development. *Physical Educator*, 48(4), 188-191.

Examined the effects of a competency-based assessment and instructional program taught by 3 upper-level physical education majors on kindergarten children's gross motor development. Gender differences found but results did not reach a significant level.

Ignico, A. (1994). Early childhood physical education: Providing the foundation. *Journal of Physical Education, Recreation and Dance*, 65(6), 28-30.

- Outlines the difference between motor skills and movement concepts and research done in both areas. Excellent overview but not much depth of detail provided.

Langton, T. W. (2007). Applying Laban's movement framework in elementary physical education. *Journal of Physical Education, Recreation & Dance*, 78(1), 17-53.

- Recognizes that fundamental skills are often insufficiently established before students are expected to apply them. Suggests a core ideology for an elementary physical education program, targeting all domains of the child. Integrates Laban's movement framework with fundamental skills providing practical guidance.

Malina, R. M., Bouchard, C., & Bar-Or, O. (2004). *Growth, maturation and physical activity*. Champaign, IL: Human Kinetics.

- A look at both chapter 10 (p. 202-210) and 11 (p. 215-233). Chapter 10 looks at the development of fundamental motor skills. Stages of development with developmental sequence tables are provided. Chapter 11 looks at motor performance in early childhood, middle childhood and adolescence and the variations with age.

Mannisto, J. P., Cantell, M., Huovinen, T., Kooistra, L., & Larkin, D. (2006). A school-based movement program for children with motor learning difficulty. *European Physical Education Review*, 12(3), 273-287.

- Investigates the effectiveness of a school-based movement program for 5-7 year old children. The **Movement ABC** was used to classify the improvements made. The findings emphasize the effectiveness of task-oriented approaches in a school-based setting for children with motor learning difficulty.

McKenzie, T. L., Sallis, J. F., Broyles, S. L., Zive, M. M., Nader, P. R., Berry, C. C., & Brennan, A. A. (2002). Childhood movement skills: Predictors of physical activity in Anglo American and Mexican American adolescents. *Research Quarterly for Exercise and Sport*, 73(3), 238-244.

- The relationship between young children's movement skills (balance, agility and eye-hand coordination) and their physical activity in early adolescence was assessed. Children's movement skills were assessed at 4, 5 and 6 years and their habitual physical activity at age 12. No ethnic differences were found and level of movement skills were not related to later physical activity. Young girls were found to be better at jumping and balancing while young

boys were better at catching. Again, shows possible gender differences to exist in the learning of fundamental skills.

Ozmun, J. C., & Gallahue, D. L. (2005). Motor Development. In J. P. Winnick (Eds.), *Adapted physical education and sport* (pp.343-357). Champaign, IL: Human Kinetics.

- Chapter defines motor development and gives an overview of the different categories of movement. Includes the phases of motor development, providing Gallahue's lifespan model of motor development and a table demonstrating the age ranges associated with the various movement phases. The fundamental movement phase and the specialized movement phase are then presented in greater detail with further tables with age-ranges for various movements.

Payne, G. V., & Isaacs, L. D. (2002). *Human motor development*. Toronto: McGraw-Hill.

- Chapter 13 and 14 give a detailed account of fundamental locomotion skills and object-control skills of childhood.

Thomas, J. R. (2000). Children's control, learning, and performance of motor skills. *Research Quarterly for Exercise and Sport*, 71(1), 1-9.

- A review of four questions regarding motor skills based on meta-analyses and review of literature. The first question assesses the characteristic (gender) differences relating to rates of learning. The second questions if children's failure to use cognitive strategies account for deficits in motor performance. The third inquires as to how children develop motor expertise and the fourth, how children control movement.

Van Beurdan, E., Barnett, L. M., Zask, A., Dietrich, U. C., Brooks, L. O., & Beard, J. (2003). Can we skill and activate children through primary school education lessons? "Move it Groove it" – a collaborative health promotion intervention. *Preventive Medicine*, 36, 493-501.

- "Move it Groove it" intervention in Australia combining physical activity with the development of fundamental movement skills. Children aged 7-10 years old over nine primary schools. Demonstrates how fundamental movement skills can be taught without adversely affecting children's moderate to vigorous physical activity.

Zachopoulou, E., Tsapakidou, A., & Derri, V. (2004). The effects of a developmentally appropriate music and movement program on motor performance. *Early Childhood Research Quarterly*, 19, 631-642.

- A comparison between the effects of a twelve month music and movement program with a physical education program over the same period of time on the development of jumping and dynamic balance in children aged 4-6years old. The group receiving the music and movement program improved significantly in both jumping and dynamic balance, more so

in balance. A reason suggested for this is that the motor skill of jumping is developed at the age of seven.

## **Sport Specific Skills / Specialization**

Baxtor-Jones, A. D. G., & Malina, R. M. (2001). Growth and Maturation Issues in Elite Young Athletes: Normal Variation and Training. In N. Maffulli, et al. (Eds.), *Sports medicine for specific ages and abilities* (pp.95-108). Edinburgh; New York: Church Livingstone.

- Covers the topic of growth and biological maturation and how this affects young athletes. Body size and physique are addressed and how these change with maturation for both males and females.

Burton, A. W., Welch, B. A. (1990). Dribbling performance in first-grade children: Effect of ball and hand size and ball-size preferences (Revision). *Physical Educator*, 47(1), 48-51.

- Looks at the effect of ball size on movement activities to determine what ball sizes best match the developmental status of the children who use them. The optimal ball size for this group of first-graders, taking into account both ball preference and actual performance, was 8.5 inches. This supports the specific recommendations in many elementary physical education textbooks, but differs a bit from manufacturers' ball-size standards for basketballs.

Cote, J., & Hay, J. (2002). Children's Involvement in Sport: A Developmental Perspective. In J. M. Silva III, & D. E. Stevens (Eds.), *Psychological foundations of sport* (pp.484-502). Boston: Allyn & Bacon.

- Includes the three stages of sport participation from early childhood to late adolescence (sampling, specializing and investment years) and links to children's motivations to participate. Emphasis on enjoyment in the sampling phase and more deliberate practice in the specializing phase.

Douvis, S. J. (2005). Variable practice in learning the forehand drive in tennis. *Perceptual and Motor Skills*, 101, 531-545.

- The effect of variable practice in learning the forehand drive in tennis for both children and adolescents. Results showed that variable practice yielded better performance than constant and specialized practice. Variable practice, however, only included changing the distance of the target.

Ericsson, K. A., Krampe, R., Tesch-Romer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100, 363-406.

- Article offers a theoretical framework for the acquisition of expert performance. Study relates to music, however, applicable to sport. Explains how different levels of performance



are attained as a function of deliberate practice. Suggests that deliberate practice should extend over a period of ten years. Outdated?

Ericsson, K. A., & Charness, N. (1994). Expert performance: Its structure and acquisition. *American Psychologist*, 49, 725-747.

- Another article by Ericsson countering the concept of LTAD and moving through the stages of generalization to specialization, suggesting extended deliberate practice should begin at a young age.

French, K. E., Nevett, M. E. (1993). The Development of Expertise in Youth Sport. In J. L. Starkes, & F. Allard (Eds.), *Cognitive Issues in Motor Expertise* (pp.255-270). Elsevier Science Publishers.

- Reviews research regarding the development of expertise in youth sport. Primarily focus on the development of cognitive skills (memory, sport knowledge, recall, response selection, perception, decision making) and their relation to sport performance. Done with a developmental focus.

Gallahue, D. L. (1993). *Fundamental movement abilities*. Indianapolis: Brown & Benchmark.

- Chapter 16. A look at specialized movement abilities. Demonstrates the relationship between specialized movement abilities and fundamental movement abilities. Provides a developmental sequence of these specialized movements for given ages: transition stage, application stage and lifelong utilization stage.

Gallahue, D. L., & Ozmun, J. C. (1998). *Understanding motor development*. WCB: McGraw-Hill.

- Section four (chapters 16, 17 and 18) offers adolescent development and the transition from fundamental skills to more specialized movement. An in-depth account given of adolescents' physical development in addition to socialization as it relates to motor development.

Hay, J., & Cote, J. (1998). An interactive model to teach motor skills. *Physical Educator*, 55(1), 50-56.

- Paper describes the development and use of an interactive model of task analysis and skill level, the Interactive Model for Teaching Motor Skills (IMTMS), for teachers, coaches and therapists to adapt to their own requirements. Breaks down both demands of the task and skill level of the learner and leads to practical examples for designing an effective learning progression.

Hautala, R. M., Conn, J. H. (2000). Sequencing for sport-specific skill learning.

- Skills-classification matrix as a learning continuum was studied. 132 middle-school students in three learning groups performed lacrosse skills in different learning sequences for four practice sessions. No significant differences found between groups, regardless of practice sequence. Some gender differences found.

Henry, F. M. (1968). Specificity vs. Generality in Learning Motor Skill. In R. C. Brown, Jr., & G. S. Kenyon (Eds.), *Classical studies on physical activity* (pp.328-331). Englewood Cliffs, N.J.: Prentice-Hall.

- Concerned with the status of knowledge of generality versus specificity in the area of motor learning and transfer of training under carefully controlled conditions.

Ignico, A., Corson, A., & Vidoni, C. (2006). The effects of an intervention strategy on children's heart rates and skill performance. *Early Child Development and Care*, 176, 753-761.

- Examined the effectiveness of a fitness infusion instructional strategy (FI) on children's activity levels and skill performance scores. Eighty-six fifth-grade students were asked to participate in six activities over a 24-week period (tennis skills, gymnastics, volleyball skills, floor hockey skills, basketball skills, and softball skills). Both the FI and control group showed significant gains in skill performance, however the FI group exhibited heart rates that more than doubled those of the control group. Suggests that FI doesn't necessarily have a negative impact on skills development.

Kirk, D. (2005). Physical education, youth sport and lifelong participation: the importance of early learning experiences. *European Physical Education Review*, 11, 239-255.

- Excellent section of the article (p.240-242) that ties in all the LTAD literature and the importance of the early years in the development of successful athletes. Outlines the sampling phase (deliberate play) and the specializing phase (deliberate practice).

MacPhail, A., & Kirk, D. (2006). Young people's socialization into sport: Experiencing the specializing phase. *Leisure Studies*, 25(1), 57-74.

- An ethnography, done to investigate the sampling phase of development in a sports club. Is extended with the specializing phase as its focus. A reduction in the number of activities being pursued, deliberate practice and the influences of socializing agents are highlighted.

Malina, R. M., Bouchard, C., & Bar-Or, O. (2004). *Growth, maturation and physical activity*. Champaign, IL: Human Kinetics.

- A look at both chapter 10 (p. 202-210) and 11 (p. 215-233). Chapter 10 looks at the development of fundamental motor skills. Stages of development with developmental sequence tables are provided. Chapter 11 looks at motor performance in early childhood, middle childhood and adolescence and the variations with age.

Ozmun, J. C., & Gallahue, D. L. (2005). Motor Development. In J. P. Winnick (Eds.), *Adapted physical education and sport* (pp.343-357). Champaign, IL: Human Kinetics.

- Chapter defines motor development and gives an overview of the different categories of movement. Includes the phases of motor development, providing Gallahue's lifespan model of motor development and a table demonstrating the age ranges associated with the various movement phases. The fundamental movement phase and the specialized movement phase are then presented in greater detail with further tables with age-ranges for various movements.

## **Transfer**

Abernethy, B., Baker, J., & Cote, J. (2005). Transfer of pattern recall skills may contribute to the development of sport expertise. *Applied Cognitive Psychology*, 19, 705-718.

- Examined whether the facilitation of expertise associated with other sport experience might arise from positive transfer of pattern recall skills from one sport to another. Looked at expert netball, basketball and field hockey players and experienced non-experts. Experts consistently outperformed non-experts in their recall of defensive player positions.

Bennett, J. P. (1994). Using skill transfer in dance. *Journal of Physical Education, Recreation & Dance*, 65(1), 12-13.

- Briefly looks at the connections between dance skills and sport skills. Describes and gives practical examples of how teaching sports skills can transfer to dance and vice versa.

Schmidt, R. A. & Young, D. E. (1987). Transfer of movement control in motor skill learning. In S. M. Cormier, & J. D. Hagman (Eds.), *Transfer of learning: Contemporary research and applications* (pp.47-75). San Diego: Academic Press.

- All aspects of motor learning are covered in detail including both transfer and specificity. Feedback, motor programs and measurement are covered within positive transfer. Negative transfer is also mentioned along with the importance of varied practice.

Sharp, B. (1992). *Acquiring skill in sport*. Burgess-Hill, UK: Sports Dynamics.

- Chapter 5 includes a section on transfer of learning. Looks at both positive and negative transfer and the explanations as to why either may occur in skill learning. Answers three questions regarding positive skill transfer in more detail. Also includes a brief section regarding generality-specificity.

Smeeton, N. J., Ward, P., & Williams, A. M. (2004). Do pattern recognition skills transfer across sports? A preliminary analysis. *Journal of Sport Sciences*, 22, 205-213.

- A transfer paradigm was employed to compare skilled and less skilled players' pattern recognition skills. Transfer was dependent on skill level, sport practiced, nature of the task

and degree of structure. The skilled field hockey and soccer players were able to transfer perceptual information or strategies between their respective sports.

## ***Developmental Domains***

Bailey, R. (2006). Physical education and sport in schools: A review of benefits and outcomes. *The Journal of School Health, 76*, 397-401.

Explores the scientific evidence that outlines the benefits of physical education and sport (PES) in schools for children and for educational systems. Children's development in five domains is assessed: physical, lifestyle, affective, cognitive and social. The potential of PES to make distinctive contributions to the development of fundamental skills, a precursor of participation in later physical activities, is also recognized.

Bompa, T. O. (1995). *From childhood to champion athlete*. Toronto: Veritas.

Periodization principles with special focus on the generalized and specialized phases of training. For different ages groups, levels of development in three domains are given and how this relates to suggested phases. General training guidelines are provided for two phases.

Burrows, L., & Wright, J. (2001). Developing children in New Zealand school physical education. *Sport, Education and Society, 6*(2), 165-182.

- Critically examines assumptions made about 'child development' that inform physical education curriculum. Highlights how children can be marginalized based on these assumptions because their developmental patterns differ from those in the syllabus. Looks at all aspects of development from physical to cognitive.

Gallahue, D. L., & F. C. Donnelly. (2003). *Developmental physical education for all children*. Champaign, IL: Human Kinetics.

- Chapters 5, 6, 24, 25 and 26. Cognitive learning and affective growth in addition to development guidelines for each of the domains.

Gallahue, D. L., & Ozmun, J. C. (1998). *Understanding motor development*. WCB: McGraw-Hill.

- Section three (chapters 10, 11, 12, 13 and 14) is an indepth overview of childhood growth and development, including fundamental movement abilities and each of the three domains as they relate to development.

Gerdes, D. (2001). Leadership education: Physical activity and the affective domain. *Physical Educator, 58*(2), 78-85.

- Recognizes that developmental growth in the affective domain remains ambiguous and elusive. Article introduces scholarly discourse that examined physical activity as a means to facilitate leadership education and training.

McHugh, E. (1995). Going “Beyond the Physical”: Social skills and physical education. *Journal of Physical Education, Recreation & Dance*, 66(4), 18-21.

- Targets the affective domain in PE. Article presents two strategies developed to cultivate social skills and self-esteem in an elementary setting.

Payne, G. V., & Isaacs, L. D. (2002). *Human motor development*. Toronto: McGraw-Hill.

- Chapter one gives a general overview of motor behavior and the following three chapters (2, 3, and 4) look at the developmental domains (cognitive, social and perceptual) as they relate to motor development and the different age groups.

Poole, J. R., Mathias, K. (1996). Higher-skilled and lower skilled children’s perceived ability and actual performance with kicking and striking tasks. *Physical Educator*, 53(4), 214-221.

- Targets the limited research in affective measures in program effectiveness. Examined if perceived ability related to actual performance for higher-skilled and lower-skilled kickers and strikers and if there is a significant difference in perceived ability between higher-skilled and lower skilled performers. Also examined if actual performance differed significantly. Results suggest that children were not very successful at matching their perceived ability with actual performance.

Stevens, D. (1994). Movement concepts: Stimulating cognitive development in elementary students. *Journal of Physical Education, Recreation & Dance*, 65(8), 16-23.

- An overview of all three developmental domains and how they are targeted through the teaching of movement concepts and fundamental skills. Again, good overview but little depth.

Worrell, V., Evans-Fletcher, C., & Kovar, S. (2002). Assessing the cognitive and affective progress of children. *Journal of Physical Education, Recreation & Dance*, 73(7), 29-34.

- Emphasizes the importance for physical educators to not only assessing the physical development of children but also their cognitive and affective development. Article discusses the issues and challenges relating to assessment in these two areas. Also offers solutions and practical examples for use in assessing K-12 students.

Yongue, B. (1998). Relationship between cognitive and psychomotor development: Piaget in the gym. *Physical Educator*, 55(1), 19-23.

- Detailed look at the cognitive and psychomotor processes involved in motor skill development. Schemes, equilibration and schema theories are outlined individually and the integrated theories provided by Schmidt and Paiget are assessed in depth.

## ***Developmentally Appropriate Pedagogy***

Everhart, B., & Everhart, L. (1998). The effects of combining a fitness emphasis during motor skill practice on third grader's enjoyment of physical education lessons. *Physical Educator*, 55(3), 114-120.

- An adapted version of the Fit-Sport Model was developed to integrated fitness tasks and sport-related skills. By the sounds of it, fairly drill-like activities (e.g. in a throwing lesson, drop to the floor and do two push-ups). Questionable testing methods!

Gagen, L. M. (2003). Choosing a racket in striking tasks in elementary school. *Journal of Physical Education, Recreation & Dance*, 74(7), 39-40.

- A brief literature review on equipment choice when teaching children motor skills and importance of have varying sizes available.

Gagen, L., & Getchell, N. (2004). Combining theory and practice in the gymnasium: "Constraints" within an ecological perspective. *Journal of Physical Education, Recreation & Dance*, 75(5), 25-30.

- Ecological perspective is explained as a foundation in regards to the many types of constraints experienced within a physical education setting. Theory as it relates to practice, providing solutions to constraint problems. Useful as it relates well to movement skills.

Gagen, L., & Getchell, N. (2006). Using 'constraints' to design developmentally appropriate movement activities for early childhood education. *Early Childhood Education Journal*, 34(3), 227-232.

- Focuses on the importance of understanding motor development theory when planning movement activities to ensure that the choice of movement task, equipment and the movement environment interact to encourage developmentally appropriate movement activities. More practical examples of constraints with suggestions to overcome.

Garcia, C., Garcia, L., Floyd, J., & Lawson, J. (2002). Improving public health through early childhood movement programs. *Journal of Physical Education, Recreation & Dance*, 73(1), 27-53.

- Preschool age. Explains the benefits of movement programs with regards to fundamental movement skills and healthy lifestyles whilst also learning both cognitive and psychosocial concepts. Provides techniques and approaches that physical educators can use to provide

children with positive, developmentally appropriate experiences with the ABCs of movement skills.

Hay, J., & Cote, J. (1998). An interactive model to teach motor skills. *Physical Educator*, 55(1), 50-56.

- Paper describes the development and use of an interactive model of task analysis and skill level, the Interactive Model for Teaching Motor Skills (IMTMS), for teachers, coaches and therapists to adapt to their own requirements. Breaks down both demands of the task and skill level of the learner and leads to practical examples for designing an effective learning progression.

Karp, G. G., & Woods, M. L. (2001). Applying conceptual learning to physical activity. *Journal of Physical Education, Recreation & Dance*, 72(8), 23-34.

- Briefly outlines the key knowledge and skills children should learn across a range of disciplines through physical education. Provides assessment examples in addition to learning outcomes for both an elementary unit on gymnastics and a middle school fitness unit.

Rikard, G., Boswell, L., & Boni, B. (1993). Teacher effectiveness in using direct instruction for student skill acquisition. *Physical Educator*, 50(4), 194-200.

- Examined teacher effectiveness when using direct instruction for developing striking skills of 138 fifth graders in two rural elementary schools. A wall volley test indicated student skill ability for continuous and accurate striking, student practice success provided daily recordings of individual practice, and the Qualitative Measures of Teaching Performance scale (Rink & Werner, 1989) indicated the effectiveness of instruction. Effective direct instruction by experienced teachers found to assist in the process of skill acquisition.

Tzetzis, G., & Kourtessis, T. (2002). Curriculum enrichment with self-testing activities in development of fundamental movement skills of first-grade children in Greece. *Perceptual and Motor Skills*, 94, 1259-1270.

- Investigated the effect of self-testing activities on the development of fundamental movement skills in first-grade children. Supports the notion that a balanced allotment of the self-testing and game activities beyond the usual curriculum increases motor-skill development.

## **Long term Development**

Alpine Integration Model (1999). *Alpine Canada Alpine, High Performance Advisory Committee*.

- Presents each stage of LTAD model in detail as it is implemented in their organization.

Balyi, I. (2001). *Sport system building: Long Term Athlete Development in British Columbia*. Canada: SportsMed BC.

- Assesses LTAD as it specifically relates to Canadian sport systems. Article describes British Columbia's athlete development model and identifies some of the gaps in the current BC and Canadian sports systems. Gives an outline of every stage of the model.

Bompa, T. O. (1995). *From childhood to champion athlete*. Toronto: Veritas.

- Periodization principles with special focus on the generalized and specialized phases of training. For different ages groups, levels of development in three domains are given and how this relates to suggested phases. General training guidelines are provided for two phases.

Cote, J., & Hay, J. (2002). Children's Involvement in Sport: A Developmental Perspective. In J. M. Silva III, & D. E. Stevens (Eds.), *Psychological foundations of sport* (484-502). Boston: Allyn & Bacon.

- Includes the three stages of sport participation from early childhood to late adolescence (sampling, specializing and investment years) and links to children's motivations to participate. Emphasis on enjoyment in the sampling phase and more deliberate practice in the specializing phase.

Smith, D. J. (2003). A framework for understanding the training process leading to elite performance. *Sports Med*, 33(15), 1103-1126.

- Sets out a comprehensive framework of the components of performance and training that should be addressed when developing a short- and long-term training plan leading to elite performance. Detailed and in-depth, from periodization of training to tapering strategies.



## **Appendix C: Useful Websites**

### Skill Development Resources

Organization	URL	Description
Physical Literacy	<a href="http://www.physical-literacy.org.uk/">http://www.physical-literacy.org.uk/</a>	<ul style="list-style-type: none"> <li>■ Excellent website of current articles and research related to physical literacy</li> </ul>
Alberta Learning	<a href="http://ednet.edc.gov.ab.ca/PhysicalEducationOnline/TeacherResources/ToolBox/interact.asp">http://ednet.edc.gov.ab.ca/PhysicalEducationOnline/TeacherResources/ToolBox/interact.asp</a>	<ul style="list-style-type: none"> <li>■ Uses Flash media to demonstrate developing and mature stages of various fundamental skills</li> <li>■ Provide observation cues to assist with pin-pointing various technical aspects of each skill</li> <li>■ Provides tips and cues to help children at the initial and elementary stage of skill development improve</li> </ul>
PE Central	<a href="http://www.pecentral.org/lessonideas/cues/cuesmenu.html">www.pecentral.org/lessonideas/cues/cuesmenu.html</a>	<ul style="list-style-type: none"> <li>■ Provides basic cues to assist practitioners with key aspects of skill development</li> </ul>