The systematic development of talent for heptathlon

Lyle Sanderson

"This is one of the papers presented at the International Congress on Youth Athletics, held in Mainz (FRG) in December 1987. The author stresses the importance of taking into account the development patterns during growth, when designing sports programmes for girls. He then examines in detail the four phases of training applied to the systematic development plan for heptathlon: initiation, basic training, build up training and systematic high level training.

1. Introduction

The purpose(s) of any plan must be clearly understood if the plan and the programmes that arise from it are to be effective. In developing programmes of sport for children and youth many purposes could be stated. From the perspective of the long term development of the talented participant, the following two purposes for a programme in youth sport would appear to be valid.

1.1 To provide an enjoyable experience for the participants.

If this is achieved the attitudes created will make it much more likely that the participants will continue to be involved in the sport and in other physical activities.

1.2 To provide a programme that will lead to the participants developing the skills and abilities required for future success in the sport.

It is unfortunate that those organizing sport programmes for children and youths often ignore these purposes in an effort to push children and adolescents to high level results at an early age. Longer term development is ignored for short term gains.

It is very important that the charac-

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teristics of the participants are understood if a successful programme is to be developed. The knowledge gained from the study of the growth and development forms the basis on which sports programmes for children and youths must be developed.

It is also important to understand the sport activity or event in order to develop the skills and abilities required to be successful.

A plan to develop talent toward success in Heptathlon must take into account the characteristics of the participants at the various stages of development as well as the requirements of the Heptathlon event.

The important factors which must be developed for success in Heptathlon are:

- Speed
- Strength (General and Specific)
- Endurance (General and Specific)
- Technical Skill (in 7 events)
- Flexibility and Mobility

2. The development patterns of girls

Children are not miniature adults. They should not be treated as such. It is very important that the knowledge that we possess concerning growth and development be applied in designing and instituting programmes to develop the capacities that will lead to athletes achieving their ultimate potential.

The capacities and limitations of pre-pubescent girls must serve as a basis for the initial basic training of the athlete.

The variation among individuals in both the onset and duration of puberty must be taken into account in any generalized plan for the development of an event. We cannot simply say that certain training factors should be introduced at a certain chronological age. The developmental age varies considerably from individual to individual and will be different for different factors.

The processes of physical development follow very similar and predictable stages for all "normal" individuals. But the rate or pace, that is the ages at which a particular child enters each stage and how long the child remains in a stage, differ greatly and cannot be predicted (Tanner, 1973).

The stages are predictable but the chronological ages at which these appear are not predictable.

The ways in which motor abilities, cognitive abilities and social/emotional abilities develop also follow through predictable stages. The stages are very similar from child to child and quite predictable but the rate at which each develops is not predictable (Smith, 1986).

Each of the abilities develops independently and at its own rate. Early maturity in one area is not necessarily indicative of early maturity in another area.

The coach and teacher must understand the development pattern of motor abilities, cognitive abilities and social/emotional abilities. It is important to apply this knowledge as well as the knowledge of physical growth and development when working with children and adolescents.

Variations in the age of the onset of puberty and in how long the child requires to reach maturity are not good predictors of athletic potential. Both early and late developing children may have the potential to become high-performance athletes.

It is thus critical that any develop-
The development plan be geared to the needs of both early and late maturing children. Marshall and Tanner (1969) found that the onset of puberty in the majority of girls varied from 10 to 12.25 years of age. The majority of girls reached the end of puberty between the ages of 13.6 and 17 years. The development plan must allow for these variations.

It is also important to realize that the changes that have taken place in girls during puberty are not conducive to rapid development during the early post pubescent years. Although girls reach puberty on an average two years earlier than boys, the boys catch up quickly.

3. The importance of play

Young children learn best through play. This is especially true for complex and threatening, or dangerous skills. Once learners of any age have gained some degree of confidence in a learning situation, they become quite willing and able to go beyond play to accept formal instruction and practice (Smith, 1986).

When adults take control of the child’s learning process, success will depend largely on how well the child is able to maintain the relaxed confidence that is such a powerful ingredient of any complex learning.

4. The phases of training

This developmental plan is based on four phases of training. It is important to realize that chronological age is not the best method of determining when each phase should start and end. The development of each participant must be taken into account.

<table>
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<tr>
<th>Phase</th>
<th>Duration</th>
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<td>Basic training</td>
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<td>3-4 years</td>
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<td>Systematic high level training</td>
<td>6-10+ years</td>
<td>Adulthood</td>
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Table 2 - Systematic development plan for heptathlon

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The phases of training are shown in Table 1.
The phases of training are applied to the systematic development plan for Heptathlon shown in Table 2.

4.1 Initiation
This is a very important phase in that attitudes toward sport are established. It is critical that children have an enjoyable experience. The children should have fun.
Children must be given the opportunity to explore and develop their abilities during this phase. A sound physical education experience at school is very important.

4.2 Basic Training
This phase may last as little as four years in early maturing children or as long as seven years in late maturing children. It should be continued until the end of puberty. This phase forms the physical and psychological base on which top level performance can be developed. A many sided approach is required to develop a wide range of abilities.

It is critical that positive attitudes toward sport are developed and maintained during this phase. The training must be arranged so that the athletes will enjoy it.

4.2.1 SKILL LEARNING
A main goal is the development of a wide range of coordination capacities. Pre-pubescent stages are best suited for movement learning. The acquisition of many movement experiences is most important.

From age 8 to the onset of puberty children have at their disposal a high natural capacity for learning and taking things in, as well as a pronounced mobility and motivation.

At no later stage can the rough form of movement skills be acquired faster (Thumm, 1967).

The neuromuscular system and intelligence are almost fully developed.

The precision of stored information depends very much on the arrangement of the training contents. The challenge to the coach (and teacher) is to present activities in a manner that will lead to the development of efficient movement pattern. It is also important to present the activities in a manner that will provide a challenge to the child but will also provide a high likelihood of success and enjoyment.

4.2.2 FLEXIBILITY
Flexibility is essential for proper skill execution and injury prevention. It should form a constant part of daily training. Joint mobility should be stressed. The elasticity of tendons, ligaments and muscles should be enhanced and maintained. The general physiologically favourable sequence of training activities should be observed as follows:
- Warm Up
- Loosening
- General Stretching
- Specific Stretching
- Strengthening

4.2.3 SPEED
Pre-pubescent children have a high intramuscular capacity. They have the capacity to increase stride rate (Thumm, 1987). Alactic training for speed involving short runs at high cadence should be emphasized. Activities which require rapid movement of the feet and legs should be stressed.

Due to lack of strength the acceleration phase will not be a prime factor.

Pre-pubescent children are not well
equipped to withstand lactic acid, so speed endurance activities should be avoided.

It is important that hurdling be introduced when the capacity to improve stride frequency is high. Games and activities involving hurdling movements should be introduced in the Initiation Phase. Running over modified hurdles should be introduced early in the Basic Training Phase.

4.2.4 ENDURANCE

Aerobic capacity can be increased in this Phase. General endurance running should be introduced.

Long duration runs where efficient running technique is lost due to fatigue should, however, be avoided. Tendons and ligaments are still relatively weak, so soft training surfaces should be utilised.

The ability to withstand concentrations of lactic acid is not well developed. Anaerobic training should be avoided. Training loads should be at heart rates of approximately 140 beats per minute. General endurance should be stressed.

4.2.5 STRENGTH

The support and ligament systems are not yet fully developed. They are not able to withstand heavy external loading. Although damage to the growth plates through strength training has not been documented, common sense indicates that this risk should be minimised. Recent research at the University of Saskatchewan indicates that general bone strength is reduced during rapid growth (Bailey, unpublished data). Heavy external loading should be avoided until after puberty.

General strength should be emphasised until after puberty. The dominant mechanism of strengthening should be through the athlete working against her own body weight.

It is important that all muscle groups be developed in harmony. It is particularly important that the support muscles of the mid-body, abdominal region and back receive attention.

Toward the end of the Basic Training Phase light free weights should be used to teach and develop sound technique in lifting.

4.3 Build Up Training

The tendency in the past has been to rush this phase in girls in order to prepare them for Junior competition. The change in the age of Junior Women by the I.A.A.F. to under 20 in the year of competition will reduce the pressure for rapid development.

This is important when one considers the changes that have taken place during puberty. The peak strength velocity observed in males about one year after peak height velocity is absent in females. The girls are subjected to the rigors of the onset of menarche at about this period. The widening of the hips and the relative lowering of the centre of gravity during puberty also reduces efficiency in females.

A gradual progressive transition through a Build Up Phase must be carried out before High Level Intensive Systematic Training is introduced. This is the phase where the automation of skills is developed. The athlete’s strength is now developing and technique in each event can be refined.

Speed development is continued. The strength is now developing to allow emphasis on the acceleration phase. The athlete now has the capacity to tolerate lactic aid which allows speed endurance training to be introduced.
Endurance training can become more specific.
The athlete is now ready to engage in a progressive programme of maximum strength development.
Flexibility must be maintained.

4.4 Systematic High Level Training
Development is still progressive with each year’s training building on what has been done in previous years.
It is now generally accepted that it takes 8 to 12 years of Systematic High Level Training before a heptathlete achieves potential peak performance. There are numerous examples of athletes over 30 years of age achieving success in Heptathlon.
In this phase the athlete can polish and build on what has been accomplished in the previous phase but she can never replace what has not been developed at the appropriate time in the Basic Training Phase.

5. Summary
The systematic development of talent for Heptathlon requires an understanding of the development patterns during growth. The physical and psychological characteristics of developing young women must be considered when constructing a systematic development plan for Heptathlon.
The important factors in success in Heptathlon must also be considered with the development of each factor given attention.
The long term development of the Heptathlete is the goal.

REFERENCES
