Approaches to technique and technical training in the high jump

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ABSTRACT

The coach’s approach to technique and technical preparation are critical for his/her athlete’s success. All coaches face this challenge, regardless of the athlete’s level of ability or performance. The author, who has coached two Olympic champions as well as a number of other top-class high jumpers and is currently the Director of the IAAF World High Jump Centre in Cologne, Germany, starts with a discussion of the importance of understanding the technical model in his event. He then describes the key elements of the approach he has developed while working with athletes who are normally quite talented but may be under-developed from a training or technical point of view. It includes two strategies for technique development: a) checking whether the athlete’s personal style contributes to performance or hinders the achievement of key technical elements and b) developing the athlete’s technical model based on an assessment of his/her reactive strength, which is the most important factor affecting the take-off in the high jump. He then gives a brief description of the four elements of the technical preparation programme he uses: a) development of general qualities, b) development of specific qualities, c) development of specific skills and d) technical training.

Introduction

Coaching for the so-called technical events, including the high jump, must include great attention to the elements of technique and technical preparation. At the IAAF World High Jump Centre (WHJC) in Cologne, the athletes that we normally work with tend to be quite talented from the point of view of biomotor abilities but when they arrive at the centre they have different training ages and vastly different stages of development, both physically and technically. This creates a specific challenge.

Of course, all high jump coaches will face a similar challenge, even if the initial performance level of their athletes might be lower. The purpose of this article is to share our experience by giving a brief outline of our approach as the basis for further discussion and development.
Technique

All daily coaching advice needs a technical model as a reference. Comments that coaches make, like “too deep”, “too slow”, “too long”, “pretty good”, etc., are the result of a comparison of what we believe we observe and the technical model we have in mind. Consequently, both observation and the technical model become critical.

For a start, observation is difficult as movements in athletics are quite fast and technical deviations, at least in top athletes, are small. To be good at this calls for permanent practice and a double check of the coaches’ eye. If the observation is wrong, the feedback given will be wrong as well.

Then we have to think of the technical model. Technical models might come from the observation and biomechanical analysis of top-level performers. As is the case for the other events, there is a lot of biomechanical data available for the high jump. But, due to its specific characteristics, the high jump allows more technical variations than the other jumps. The length and speed of the approach, the curve of the approach run, the take-off time, the take-off angle and the rotations around the three axes are some of the specific points where variations in the model are possible.

As is the case for all coaches starting work with a new athlete, the technical model we are presented with is an important consideration when we begin with athletes at the WHJC. With respect to this consideration, we follow two strategies in the area of technical analysis and correction.

Strategy 1

Our first strategy is to identify the key elements in the high jump. The meaning of the term “key element” is: an aspect of the technique that must be done correctly. All successful jumps show these elements and there is no alternative to getting them right. Even athletes with extreme technical variations (for example, the 2007 World Champion Donald Thomas of the Bahamas) do so. If you violate these elements it is definitely a technical fault.

Some relevant key elements are:

- increasing stride frequency in the approach,
- decreasing flight times at the end of the approach,
- inward lean,
- acceleration of the hip before the touchdown for take-off,
- backward lean (body straight) at the touchdown for take-off,
- full body extension at toe-off,
- arching or rotating over the bar.

Once these are understood, our job is to check whether the athlete’s personal style contributes to performance or hinders the achievement of these key elements.

Note that half of the elements listed concern the approach. My experience shows that coaches in the high jump tend to underestimate the importance of a proper approach run. As there is no maximum speed and no take-off board, they might consider it less important than in the long jump or triple jump. But, as in these other jumps, an effective take-off is not possible without a proper preparation.

In this context the penultimate ground contact is of major importance. The penultimate stride creates the pre-conditions for the take-off. Some relevant criteria are:

- deepest CM position is during amortisation of the penultimate stride and not during the take-off,
- at full sole contact, the knees are almost parallel,
- at full sole contact, the shin of support leg is vertical.

Looking closer at the last of these criteria, we can say that the shin angle at the time of the penultimate contact is an expression of the body’s orientation in the preparation for take-off. An angle of less than 90° is linked with a moderate forward lean, which complicates reaching the proper body position at the touchdown for take-off (see Figure 1).
Strategy 2

Our second strategy is to start the individual technical analysis with an assessment of the athlete’s reactive strength capacity. According to long-term coaching experience, reactive strength is the most difficult physical quality to change. For sure we can work on it, we can develop it, but it is extremely difficult to fundamentally change an athlete’s neuromuscular patterns and time programmes. Depending on this physical quality, the athlete’s ideal take-off time will vary. Fortunately, success in the high jump is possible with different variations of this aspect (in fact it’s not the take-off time that is important but the range and speed of motion of the centre of mass (CM) during take-off).

Take-off time will effect the preparation of the take-off and the activity of the free elements during take-off. The preparation of take-off reflects the lowering of the CM and the arm action during preparation (single arm, short double arm, long double arm). And this finally affects the approach velocity. Figure 2 summarises the order of influence.

From this explanation we can see that the process of developing technique does not start with one technical model but with a physical quality. Depending on this quality, the technical elements are evaluated and the results will dictate the technical model we will select and develop. The central question is: Do the elements fit to and are they in good harmony with the athlete’s basic capacity?

Technical preparation

In a long-term perspective, technical preparation for the high jump consists of four elements: development of general qualities, development of specific qualities, development of specific skills and, finally, technical training. Below I outline the key aims that must guide the coach in his/her planning for each of the four.

General qualities

a) Running - There cannot be an efficient approach in the high jump without good running technique. The basic mechanics of running must be developed and therefore we devote a lot of training time to working on this aspect.

b) Strength and power - Well-developed strength of the whole (!) body is essential for all jumpers. The focus of interest is on the whole kinetic chain, with special emphasis on trunk and hip stabilisation. However, it is important to keep in mind that strength and power have no value by themselves, they are important as a support function for the reactive strength capacity.
Specific qualities
As stated above, reactive strength is the most important biomotor ability for the high jumper. Whatever the initial quality of an athlete’s reactive strength, the adaptation of the neuromuscular system to short ground contacts must be developed by basic jumping drills in a lot of variations.

Specific skills
We develop certain technical elements (e.g. arm action, lead leg drive, hip acceleration in the last stride, active transition in the penultimate stride) through a variety of specific drills done away from the crossbar. This allows for more repetitions and the acquired skills can be easily transferred to the approach and take-off once the athlete has mastered them in the drills.

Technical training
Our systematic technical preparation as described has two consequences. First of all, technical training is quite limited in all periods. It includes a maximum of two sessions per week with 10-15 jumps each. Secondly, jumps from a short approach are dramatically less than the number many coaches use. I have found that by allowing more repetition of short-approach jumps, we increase the risk of major changes in the dynamics of the jump. The take-off quite often becomes longer, the lowering of the CM is deeper and the speed component is markedly reduced. Therefore, instead of using too many jumps off of a short approach, we prefer using the specific drills away from the mat.

Conclusion
The coach’s approach to technique and technical preparation are critical for his/her athlete’s success in the high jump. At the IAAF WHJC in Cologne, we have developed an approach that can be valuable for use with athletes of any level of talent and performance.

In this approach we use two key strategies for the area of technique development: a) check whether the athlete’s personal style contributes to performance or hinders the achievement of key technical elements and b) develop the technical model based on an assessment of the athlete’s reactive strength.

Our technical preparation programme comprises four elements a) development of general qualities, b) development of specific qualities, c) development of specific skills and d) technical training, for which the key aims must be understood.

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