

Rebecca Jackson

KIN 856

Technique Fundamentals – Technique Teaching Plan

When deciding what task I would analyze, I wanted to identify an area I could use improvement in my coaching, and that is why I selected sprint starts, focusing on starting blocks. When I was a runner I was not comfortable using blocks and therefore never recognized the benefit. Now, as a coach, my dislike has led to ignorance in basic technique and usage, so my athletes are at a disadvantage. By breaking down the technique (how a movement is performed) fundamentals (the key elements all athletes should do) I feel I will be better able to assist athletes in their use of starting blocks to start their sprint race.

I found examples of biomechanical research on block starts and while I will not list all links, the two sites below had relevant studies
<http://facta.junis.ni.ac.rs/pe/pe200602/pe200602-03.pdf> http://www.coachesinfo.com/index.php?option=com_content&id=352&itemid=181

To analyze the fundamentals, I started with a sequential list of what happens in a block start developing into the first 30-60m of the race

- Block Introduction and Set-Up
 - pedal position
- “On Your Mark”
 - enter block
 - foot placement
 - knee angle
 - arm placement
 - head placement
- “Set”
 - change in center of mass
 - head position
- “Go”/Drive Phase
 - pushoff
 - arm swing
 - 45° body line
 - first foot strike
 - control stride length/frequency
 - body position/gradual vertical position

Next I reviewed this list and wanted to select elements that would be given the highest priority when providing instruction, but also wanted to consider how elements were related from phase to phase. In the table below you will see how I would plan to teach technique fundamentals

| Fundamentals | Rational | Instruction Description |
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| Starting Block Introduction Set-Up Position | <p>As the law of inertia emphasizes our bodies' desire to resist any change in its current motion state. Starting blocks are a way to "kickstart" this change in motion. To begin I would need to show athletes how to set up starting block pedals, how close to put it starting line, and give a general idea of how to position one's body in the crouch start. Your "fast" foot needs to be in the rear pedal, as we are looking for a good combination of quickness and power (impulse) from this leg. If your body is too crouched you will be quick, but need more power, while a more spread out stance requires less power, but takes longer in terms of block contact. The maximum impulse occurs in a medium start position. This position also is important to initiate the lowering of your center of mass, in preparation for rapid acceleration (coming up in a later fundamental).</p> <p>I would begin teaching this fundamental, as it is necessary to get to any of the other elements</p> | <p>Many athletes can discover which is their "fast" leg by standing on the starting line, close your eyes, and have someone push you forward. Typically the foot that comes forward to stop you from falling will be the foot that is back in the blocks.</p> <p>Next, setting up the pedals typically takes some individual adjusting, but a starting point for a medium start (considered the most biomechanically efficient) has your knee of the lead leg is near the starting line, while the knee of the rear leg is place in a spot opposite to the front part of the lead foot. Typically your toe-to-toe distance will be about 40-55cm. One tip for athletes who are having trouble with the positioning is to do 2 of their foot lengths from the starting line for the front pedal and 3 of their foot lengths for the rear pedal.</p> <p>One key element that I will repeat in my instruction is consistency in repetition. I can be flexible with placement at first, but once they decide on a desired position/placement, this needs to remain constant for comparison and suggestions for improvement in later fundamentals</p> |
| Push off | <p>(The legs and arms are closely related and I initially tried to separate them into different fundamentals, but it became a debate much like the chicken or egg question, so I decided to integrate them together into this issue.)</p> <p>As athletes push off of the blocks they need to find a balance of horizontal and vertical velocity, which has been shown to be best achieved at 45° angles. As we have seen, the greater the impulse exerted, the greater the resultant velocity Runners should be pushing off on both feet, but as the rear leg moves forward, the lead leg will extend and exert force in a straight line through the ankle, knee, hip, trunk, and head. (where the 45° angle can be seen). The quickness of the rear foot is important in achieving the 45° position as well. This is</p> | <p>To begin this instruction I would present athletes with the comparison of pushing off a wall in swimming to using starting blocks. Then I would have prepared some video of good and back images of athletes coming out of starting blocks so they have a visual of the angle they should be making as they exit the blocks.</p> <p>Once we get on a track, I would make sure their toes (often first 3-4 spikes) are touching the ground, while the rest of their foot is against the pedal.</p> <p>They should also be aware that their arms will "split" with the forearm of the front leg shooting forward, while the other arm does the opposite.</p> |

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| | <p>directly related to the arm swing, which counterbalances leg movement and often leads legs in tempo and range of movement.</p> <p>This leads to later fundamentals, and help athletes understand why they are using the blocks and what their body position should be.</p> | <p>I would give athletes a few opportunities to “push” out of the blocks, reminding them to drive their arms, but after a few tries would position myself or another athlete behind the arm that will shoot forward to hit it right as they push off, further emphasizing the exploding motion.</p> |
| <p>Stride Length & Frequency</p> | <p>As an athlete first exits the starting block the stride length and frequency will be low, due to inertia. Often athletes hear “get out quick” and think they need to take a large first step and end up overstriding. This causes the torso to rise too rapidly, shifting their center of mass upward, forcing them to “pull” their hips over their foot, reducing stability. This has an inhibiting influence on the acceleration they need to be creating in their first few strides.</p> <p>As momentum builds, athletes’ stride length and frequency will stabilize. Typically this happens between the 9th and 12th stride (at $\approx 10m$) when the contact time shortens and flight time lengthens. The body will also work to a vertical position by this point. This allows athletes to continue accelerating, reaching their maximum velocity 50-60 m into a race</p> <p>This fundamental is important to maximize the effectiveness of the above actions, but may be too complicated at first when an athlete was just being introduced to the blocks</p> | <p>After some basic description, I would start working on an athlete’s initial foot strike by putting a marker for the desired first step (about 50-60 cm from start). This mark is not for the athlete to look at, but rather for me to use and provide feedback to the athlete about their start.</p> <p>I might also extend a bungee or string perpendicular to the lanes, 50-60 cm from the start, to force athletes to keep their bodies and heads down. It will be easy to see if they have to “duck” or are low enough in their first few steps.</p> |
| <p>Center of Mass Shift in Set Phase</p> | <p>The goal of the transition from the “on your mark” to “set phase” is the shift of the center of gravity up and ahead of the feet. This forces the runner to accelerate quickly or fall.</p> <p>This fundamental could be addressed a little later in the teaching process. Some of this will happen naturally, but can be focused on and refined.</p> | <p>Athletes need to be ready to feel “uncomfortable” in the starting blocks. Since acceleration is the desired result, feeling like you are about to fall in the “set” phase is good.</p> <p>I would guide them to raise their knees and elevate their hips to shift their center of gravity. (Front knee at $\approx 90^\circ$, back knee at $\approx 120^\circ$, hips above the height of the shoulder). Their head should stay in line with their flattened spine, while their eyes look a few feet in front of the starting line.</p> |