**ESS Concept for Simulations**

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| *Simulation Title* | **Projectile Motion in Football** |
| *Applied Scenario* | An individual kicking a football from one end (start) of the field towards the other end (end). |
| *Simulation Aim* | To allow students to explore and learn about the relationships between height, angle and velocity at release when projecting an implement. |
| *Simulation Design* | Students should be able to explore the projection of an implement   * by changing the projectile angle at release (variable 2): 0 to 90° * by changing the projectile height at release (variable 1): 0 to 2m * with the projectile velocity release (fixed) being a constant at: 40m/s   Key objects   * The goalkeeper as the performer (Person) * Football as the implement for projection * Football Field as the area for projection |
| *Simulation Outcome* | For each scenario determined by the set values of the variables, students should be able to observe and compare the trajectories of a projected football on a height-distance graph. |
| *Possible Question(s)* | 1. Describe 2. State the projection angle at release that will allow a goalkeeper to kick the ball from the ground to achieve a maximum distance. 3. Explain, using projectile motion, the difference a javelin thrower would |
| *Learning Outcome* | Describe how projectile motion can influence performance   * height of release, angle of release, velocity of release * flight path (trajectory) |
| *Concepts/ Topics* | Projectile Motion   * Height at release * Angle of release * Velocity at release |

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| *Simulation Title* | **Effect of Acceleration in Shuttle Run** |
| *Applied Scenario* | An individual performing the shuttle run. |
| *Simulation Aim* | To allow students to explore and learn about the relationships between distance, displacement, velocity and acceleration (and deacceleration) |
| *Simulation Design* | Students should be able to explore the relationships,   * by changing the level of deacceleration/acceleration (variable 1): Low (1m/s2), Medium (2m/s2), High (3m/s2) * by changing the level of velocity (variable 2): Low (2m/s), Medium (3m/s), High (4m/s) * with the displacement shown as a non-adjustable variable during plotting of graph * and the distance of the shuttle run fixed at 10m x 4 laps |
| *Simulation Outcome* | For each scenario determined by the set values of the variables, students should be able to observe and compare the plotted velocity-time graphs. |
| *Possible Question(s)* | 1. Explain the difference between distance and displacement. 2. Explain how acceleration affects the velocity of the shuttle run. |
| *Learning Outcome* | Explain the effects of acceleration on biomechanical movement in sports and physical activities |
| *Concepts/ Topics* | * Distance * Displacement * Velocity * Acceleration |