UK SPACE AGENCY

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MISSION X

TRAIN LIKE AN ASTRONAUT

MISSION: CONTROL!

Team Leader Guide

MISSION OVERVIEW

Students will perform throwing and catching techniques on one foot.

LEARNING OBJECTIVES:

- Improve balance and spatial awareness.
- Make and record observations about improvements in balance and spatial awareness.

FAST FACTS

Subject: Physical Education
Age: 8-12
Lesson Time: 15-25 min
Location: a flat, dry surface with access to a flat, solid wall for bouncing

Skills: balance, coordination, stability, hand-eye coordination, reaction time, concentration.

INTRODUCTION

On Earth, we use a variety of cues to sense the position of our bodies, while stationary or moving. We use touch and pressure cues (such as weight on our feet) and visual cues (such as the location of the ceiling and floors) to determine orientation. On Earth, our sense of uprightness is determined by the pull of gravity as sensed by the balance organs of the inner ear. Our brains integrate all this sensory information to allow us to detect our body orientation and permit us to move within our environment.

↑ ESA astronaut Samantha Cristoforetti floating sideways with her colleagues, NASA astronaut Terry Virts (left) and cosmonaut Anton Shkaplerov (right) in the International Space Station.

However, in an environment with less gravity, the brain needs to relearn how to use these sensory signals. In space, astronauts free float, so there are no pressure cues to the bottom of the feet. Their visual system can be fooled because there may be no distinct floor or ceiling in a spacecraft. In addition, information from the balance organs of the inner ear needs to be reinterpreted by the brain so astronauts can move in weightless or low-gravity conditions. As the brain relearns how to interpret sensory information in space, astronauts sometimes experience disorientation and nausea at least for the first few days in space. Balance and spatial awareness, along with overall fitness, can be improved by just practising simple exercises involving balance and movement.

LET'S TRAIN LIKE AN ASTRONAUT!

MATERIALS

Team Leader
- Watch or stopwatch/timer.
- Tennis ball (one per student or one per group).
- Gym ball (football or similar, one per group.

Student
- Mission Journal and pencil.

Optional to be used in Mission Adaptations
- A series of smaller balls.
- Velcro gloves.

PROCEDURE

This activity can be carried out either individually or as a group:

Individually:

1. Students bounce a tennis ball off the wall and try to catch it whilst balancing on one foot.
2. Students raise one foot up behind them, and level with their knee.
3. Count how many seconds they can stand on one foot whilst throwing and catching the ball The aim is to do this for at least 30 seconds!
4. Students continue practicing this activity until they can last 60 seconds without having to start again.

As a group:

1. Divide the students into groups of 6 or more players and form a circle, standing at least one arm's length apart.
2. Students balance on one foot whilst tossing a tennis ball to a player across from them.
3. If the player drops the ball, they should hop on one foot around the circle before rejoining the game.

SET-UP

Students should be more than an arm's length apart.
At least six players per group is optimal for the group activity.

THINK SAFETY

- Inform students of the importance of a safe environment when balancing (trip hazards, sharp/dangerous objects etc.).
- Provide support for stability, if necessary.
- Be aware of signs of overheating – ensure students are properly hydrated before, during and after an activity.
- Be sure to use suitable balls – something that will not hurt.
- A warm-up and cool-down before and after activity is always recommended.

MISSION ADAPTATIONS

Increase Diffculty

- Use a smaller ball to throw and catch.
- Increase the distance between the students and the wall, or the size of the circle if playing in a group.
- Students only throw and catch with their nondominant hand.
- In a group, students throw the ball to another student randomly, not in a sequence.
- Instead of balancing, students can try hopping.

Increase Accessibility

- Students complete the activities standing still rather than balancing on one foot.
- For the group activity, when failing to catch the ball, students remain in the circle but count themselves out of the game for 10 seconds.
- In a group, use a bean bag rather than a ball, so it is easier to grasp.
- This activity can also be performed while seated by focusing more on the coordination skills.

Decrease Difficulty

- Decrease the distance between the students and the wall or each other.
- Give a countdown before throwing the ball when playing in a group.
- Use a ball that's easier to catch (this could be bigger, or less bouncy!)
- Use Velcro gloves to catch.

This resource has been adapted from NASA's "Mission: Control!".
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