Civil Air Patrol's

ACE Program

Aerospace Connections in Education

Grades K - 6

CIVIL AIR PATROL

CAP ACE Program

Grade 6

Instructor Guide

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Program Support

Civil Air Patrol's ACE Program

From Football to Flight
Grade 6 Physical Fitness Lesson #5

Topics: agility, ability, decision-making, forces on an object (PE, social studies, science)

Lesson Length: 45-60 minutes

Objectives:

- Students will learn about an NFL player turned astronaut, Leland Melvin.
- Students will participate in a relay football game.
- Students will demonstrate developmentally appropriate eye-hand coordination.
- Students will demonstrate developmentally appropriate motor skills.
- Students will be involved in honest sportsmanship and fair play.
- Students will explore the forces and motion on an object, such as a football.

National Physical Education Standards:

- Standards 1,2,3,4,5

CCSS.ELA

- Literacy.RH.6-8.8 Distinguish among fact, opinion, and reasoned judgment in a text.

Next Generation Science Standards:

- MS-PS2-1. Apply scientific ideas or principles to design an object, tool, process or system.
- MS-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on an object and the mass of an object.

Background Information:

If you've ever watched a football game, you might have wondered how such an unusually shaped ball can soar so far and so accurately. It turns out the football shape is quite aerodynamic. A football is considered a prolate spheroid which is obtained by rotating an ellipse on its major axis. Rotating or spinning the football in a tight spiral creates a gyroscopic effect which helps maintain control and trajectory through the continual spinning. As the tight spiral sails along its path, air on the surface is broken up, reducing drag and allowing for a smoother ride. On the other hand, a wobbly pass, also known as a wounded (or lame) duck, causes greater drag because there is more surface area for the air to encounter. So, for speed and accuracy, a tight spiral is your ticket! The video, Physics of Football, demonstrates and explains this concept perfectly!

In terms of statistics, the probability of having many professional athletes OR astronauts in a classroom are slim. Leland Melvin, however, is a wonderful illustration of how hard work, determination, and dedication shattered statistics as he became the only astronaut that is also a former professional athlete.

Several factors, like Melvin's love for chemistry at an early age, set things in motion for a career in science and his ability to excel on the football field made him a natural at sports. Leland Melvin is an example of how if we simply stretch ourselves, refuse to accept less than our best, and set goals that require us to challenge ourselves, we can become anything that we want to become. For Melvin, the sky was not even the limit... it was beyond!

Life should not be looked at as a sprint, but as a marathon, or for our purposes, a relay. Today, we will play a football relay in honor of Leland Melvin and his accomplishments.

Materials:

- "Leland Melvin: Astronaut by Chemistry" courtesy of NASA (included)
  *Leland Melvin "tells" this story of *Astronaut by Chemistry (and much more)* in a 15-minute video at Founding Stories - GRIT: The Strength to Overcome Adversity at the 2018 Tom Tom Founders Festival- Leland Melvin
- footballs (1 ball for every 10 students)
- cones (1 for every student)
- whistle (for teacher)
- rocket footballs (provided for students by CAP)

NOTE: If possible, have the field set up prior to activity. Also, the rocket footballs provided by CAP may be distributed for use after the lesson to help students remember the story of Leland Melvin, as well as to experiment with the flight of a football, using the rocket football. (The additional activities section has ideas for use with the rocket footballs.

Lesson Presentation:

1. Ask students if they think it would be cool to become a professional football player. Ask them to identify skills needed to become a successful professional football player. One main word they should be guided toward is the word agility. **Agility** is the ability to change the body's position, and requires a combination of balance, coordination, speed, reflexes, and strength.

2. Ask the students if they think it would be cool to be an astronaut. Ask them to identify skills needed to become an astronaut. One main word they should be guided toward is the word ability. **Ability** is aptitude, intelligence, skill, and expertise.

3. Chances are that most students will think that both professions are pretty amazing jobs. Explain to them that they will be learning about a person who became both a professional football player AND an astronaut. Most students will seem surprised at such an accomplishment.

4. Read the story of "Leland Melvin: Astronaut by Chemistry" to students. Discuss how Melvin's *agility* helped him to excel physically and how his *ability* helped him to achieve academically. Also, discuss how he paid attention to the things that happened to him in life so that he did not miss an opportunity to "seize the moment" and take advantage of the incidental things that came to him in life.

5. Ask the students what character traits Melvin possesses in order to accomplish such extraordinary feats. Determination, self-motivation, dedication, responsibility, among others, should be discussed.

6. Now explain to students that in honor of Leland Melvin, they are going to play a football relay game. Before you begin, be sure to share the information about the aerodynamics of a tight spin vs. a wobbly/lame duck spin, as mentioned in this lesson's background information.

7. Using 2 teams of 10 students, line up students in a straight line. Each student should stand at a cone. Cones should be placed 20 feet apart.

8. The person at the front of the line for each team will have the football. When the teacher blows the whistle, the first student will throw the football to the next person in line on their team. The receiving student does not have to catch the football, but does have to return to his or her cone after retrieving the football if the ball was dropped. Then he/ she will throw the football to the next team member.

Football Relay Game Diagram

o=cones x=students *=football

When the teacher blows the whistle, the student at the front of the formation will throw the football to the person standing at the next cone.

9. This process should continue until the football is thrown to the last member on the team, who will then throw the football to the person who they received it from. After the last team member has thrown the ball starting the process of going back up the line, he/she should kneel or sit beside his/her cone. Each person up the line should do the same until the football has made it back to the first person who threw the ball.
10. The winning team of the relay is determined by which team moves the football down the field and back up the field first. NOTE: Players do not kneel or sit as the football makes its way down the field. They only kneel or sit beside their cone following their second throw so that it is easier for the teacher to determine the progress of the final plays of the game.

Summarization:

Character Connection: People face obstacles and challenges every day in life. Often, how we respond to those challenges determines a lot about our character and ultimately, our career. Leland Melvin is an inspiration to us all as he pursued two very ambitious dreams and attained them both. Melvin's accomplishments were not made overnight. They took years and years of dedication and determination. As previously stated, life should not be viewed as a sprint or a dash, but as a marathon or a relay, that through perseverance and commitment, can be a victory.

Leland is giving back to the community as he works with children to inspire them to reach for their goals and follow their dreams. His is truly a man of agility and ability that we can each try to emulate in our lives. If time, show the students the 5-minute video of Leland Melvin with his motivational messages in From NFL Player to NASA Astronaut: Leland Melvin.

Drug Demand Reduction (DDR) Connection: See page 10.

Assessment:

Teacher will observe students working together as a team in the football relay, following directions, and demonstrating good sportsmanship.

Additional activity ideas to enrich and extend the primary lesson (optional):

- Have the students practice throwing the rocket footballs provided by CAP. Have them shoot for a target; determine length of flight; and compare and contrast the flight of a football with the rocket football, which has fins to help with directional precision.
- Have the students watch the video, the Physics of Football, and discuss and demonstrate the differences between the "tight spiral" and the "wounded duck" football throws. Which would one want to throw for accuracy and distance?
- Allow students to use the Internet to research qualifications and criteria to become both an astronaut and a professional athlete. Have them make a list for each and categorize them as agility or ability.
- Allow students to research a career that they are interested in. Have them to write a job description on that career choice including the requirements necessary to make that career dream become a reality.
- Have students create a new class game using a football to demonstrate physical agility.

- Have students play Agility Ability Stars. In this game, students will increase their understanding of the skill-related fitness component of agility. They will participate in quick changes of direction, keeping center of gravity low, and staying on the balls of their feet as they are timed in the activity with a stopwatch or other time-keeping device.

- Tape or chalk to mark four-foot stars on the floor or ground. (one star/2 students)
- Students will pair up with a partner. One partner will keep the time as the other partner traces the points of the star with one of the following movements; shuffle slide, sprint forward, jog backwards, or fast-pace walk. When students are tracing the star with their foot pattern they need to make a sharp precise turn at each point of the star.
- The students should alternate roles. Try the activity several times letting each student have a turn at each of the foot patterns. They should try to improve on completion time, while still tracing the star.
- Adding a musical component to the activity adds an extra bit of interest.
- Make the star shape larger for the students to trace and have them try different loco-motor skills, such as skipping, jumping or hopping while tracing the star.
- Have the students record their time and try to improve on their time over a few class periods.

Additional Resources, Videos and Literature:

Video Physics of Football

Football: Then to Wow! Time Home Entertainment Inc, 2014. (Amazon)

A 2018 14-minute video with Leland Melvin speaks about his adversity in moving toward his goals in life.

Founding Stories - GRIT: The Strength to Overcome Adversity at the 2018 Tom Tom Founders Festival

Video on throwing a football, the X and Y Axis of it all: Geometric Shapes: Science of NFL Football

Video Wilson Football Factory Tour

Leland Melvin: Astronaut by Chemistry

By Brandi Dean at Johnson Space Center, Houston (Feb. 2007)

Leland Melvin never meant to become an astronaut.

He remembers Neil Armstrong walking on the moon, but he doesn't remember being especially impressed.

"I think I was in my own little world of dirt club battles and cowboys and Indians," he said. "I vaguely remember it, but it wasn't something like, 'Hey, I want to do that!'"

What did impress him was chemistry.

"My mom gave me a chemistry set when I was a kid, and I made this little concoction and blew up something on their rug," Melvin said. "That was like, 'Wow.' So I became a chemistry major."

Landing a job at NASA didn't change his focus. And even when a friend in the office told Melvin he'd make a great astronaut and gave him an application, he blew it off.

"I said, 'Yeah, right – whatever,'" he recalled. "I didn't fill it out."

But then that friend became an astronaut and awoke Melvin's competitive spirit.

"The next year, I filled out the application, thinking, well, if he could get in, so could I."

It was the kind of serendipitous friendship that Melvin said he encountered at every fork in the road that led him to being an astronaut, starting with his high school football coach.

Melvin went to the University of Richmond on a football scholarship that almost slipped through his fingers – literally. He was a wide receiver on a team that ran the ball a lot, so from a stats standpoint, he didn't look so great. And when a scout came to see if there might be more to him than what showed up on paper, Melvin almost blew it.

"He saw me drop a touchdown pass in the end zone at our homecoming game. So he's walking out of the stadium, and my coach, who believed in me, said, 'Hey, Leland - catch the ball.' I ran the same play again, and this time I caught the ball. We won the game."

The scout heard the crowd screaming and turned around to see Melvin in the end zone.

"He said, 'Wow - he came back from such a horrific failure in front of all his friends,'" Melvin said. "'He was able to overcome that.'"

The resulting scholarship led to a chemistry degree and a place on the Detroit Lions. And there he might have stayed, if not for an injured hamstring and a chance meeting. But before the season even got going, Melvin was out of commission.

He was drafted by the Dallas Cowboys, but it would be a year until he was able to play for them. So he took a courier job at his agent's office to make some money in the meantime. One day, while delivering a package, Melvin bumped into the husband of one of his old professors.

"He said, 'Hey – what are you doing?' I said, 'I'm waiting to play football.' He said, 'Why don't you talk to Glenn Stoner at the University of Virginia in the materials science department?' And I said, 'Why would I want to do that?' And he said, 'Just go do it.' And I listened."

Melvin went and talked with Stoner and ended up with a research job to keep him busy during the off season. Originally his reasoning was that he would make more money doing research than he would delivering packages - but when the next semester started, Melvin decided to enroll in graduate school, knowing that he'd have to leave for Dallas before it was over.

When the training season began, Melvin was playing football by day and taking videotaped materials science engineering graduate courses by night. It wasn't easy, but when he injured his hamstring again before the season started, he was glad he'd done it.

"That was the end of my football career," he said. "But I just went right back to grad school that fall and worked on my master's degree."

Image to left: Astronaut Leland Melvin talks to students in the cafeteria at Gainesville Elementary School, a NASA Explorer School in Gainesville, Ga.

Two years later he was hired by NASA Langley Research Center, which put him in position to be given the astronaut application. But again - it took the prompting of a benevolent acquaintance to keep Melvin on track. A recruiter flagged him over to a NASA booth at a job fair just as he was preparing to leave.

"She said, 'What's your name?' I told her. She said, 'I've been looking for you.' Come to find out, she was looking for me all day because the dean had said, 'Leland is a good guy - you might want to look at him.' So the next week I had a job at NASA Langley."

Melvin said he would never have thought to apply to NASA on his own, just like he wouldn't have thought to work as a research assistant in the off season.

"All these little things," he said. "If I hadn't bumped into the professor in the parking lot, it's very possible that I would have had a different path. If I hadn't been approached by this recruiter at the end of this career fair - who knows? But all these things lined up."

And he's glad he was paying attention when they did.

"Lots of times we don't know what we want to do with our lives," he said, "but other people have more of a vision or maybe know things that we don't know. So always listen to others and don't discard the information that you have. It could be your new plan."

Leland Melvin's career has largely been defined by his ability to use his hands: first to catch a football and then hold onto it as he ran down the field.

Then, his professional success depended on his ability to maneuver a joystick and other controls as he wielded a robotic arm on a spaceship.

"Flying in space … it's one of the most amazing things I can think of."