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Animals in Space!

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English Hidden Figures Lesson Plan: Animals in Space!



Dear Teacher,

This is an extremely flexible project about the role of animals in space that you should adapt to fit your classroom's needs. When I designed this lesson plan, I kept in mind different socioeconomic levels, and access to technology (or rather, lack thereof). I have attached my personal "daily" schedule for your use and guidance, but this project can be adaptable to any classroom without any set time restrictions. The point of this project is to allow students to learn how to research and present information. Additionally, it corresponds with the *Hidden Figures* nonfiction book because it requires students to look beyond historical advancements and find the individual animals who paved the way for our present.

For research, I personally used a lot of databases. I have access to the WVU library database, and this is where I began my search. I understand that different schools have different access to resources, so as an alternative to this database, I recommend Wikipedia. While Wikipedia is a questionable source, there is always a reliable works cited page at the end of articles. This works cited page is a great place to start, because the sources are in a compact list for you to click through. I could find a few scholarly articles through Wikipedia searches that allowed me to explore the research behind animal experiments. Personally, I found a lot about animal anatomy and how it compares to that of a human. Did you know that dogs have very similar heart rate

tendencies to humans? I didn't, but now I do! The databases and Wikipedia articles allowed me to find out a large array of fun facts regarding animals in space.

For further research, I recommend looking at the NASA website. This website has a ton of information, and it is the most credible source on the subject. Simply by typing "animals in space," or "space monkeys," (or whatever you're looking for information on), brings up a ton of information and case studies where animals have been used in NASA experiments. There is information regarding both past and present experiments, and also experiments from other countries like Russia. Combine the NASA website with some YouTube videos, and this project is a piece of cake! YouTube is actually a wonderful multimedia platform to explore. There are a lot of historical accounts, as well as cutesy videos that regard animals in space (see daily lesson plan for specific links). These could be a great way to get the class interested in the project subject!

Another recommendation that I would make is for you to read Mary Roach's *Packing for Mars* if you have the time. On a pleasurable note, this book is amazing! Roach is a very inventive and satirical writer; her dry and witty sense of humor draws you in. Aside from the creativity of this book, I also think it would give you some deeper insight into the subject. Roach guides her audience through the intriguing topics of life in space and how life on Earth allows for these advances. However, I doubt you will have time to read for fun during the school year, I do recommend this book to help with background information for this lesson plan!

Below, I've summarized two articles that will help you prepare to introduce the topic of animals in space to your students.

Animals in Space: From Research Rockets to the Space Shuttle by Colin Burgess and Chris Dubbs:

This article opens with a very morbid acknowledgement thanking the animals that have given their lives for science's advancements. The authors look at a couple different animals, but the emphasis is on dogs in space. The first dogs in space were referred to as "Satellite Dogs," and their participation in the space race slowly turned from orbital to suborbital, as the researchers chose which species of dog would be the first into space. They use photos and cited evidence to support their findings. Unfortunately, much like the acknowledgement, the articles note that each animal's fate

is terminal, and almost every animal gave its life for the cause. The source looks at how Russians and Americans differed in their experiments during the space race, and which animals they chose to experiment on and why. For specific citations, go look at the “Notes for Teacher” bullet points!

“The Secret History of the First Cat in Space” by Rae Paoletta

This article looks specifically at the first cat in space, and her successful return back to Earth alive. Felicette, the first space cat was actually a replacement! The first cat went missing before his inevitable take off. Her brain waves were studied to see how humans could possibly be affected upon take off and return. The article quotes the French version of NASA, the CNES (Centre National d'études Spatiales), stating that Felicette made a “valuable contribution to research.” The article moves onto look at other domesticated animals, like dogs. It notes, “Laika the [Soviet] dog led directly to Yuri Gagarin becoming the first human in space, which led to Alexey Leonov becoming the first human to spacewalk.” Then the article goes onto look at why domesticated animals are no longer used for space travel. This article provides a lot of useful information about animals in space, and provides the students with an example of a credible news source.

Animals in Space: Facts

Below I've listed a few facts that you can include when discussing this project with the students.

- Animals were used to test the “survivability” of humans in space, because of their similar anatomical make ups
- Animals were also used to investigate and explore the effects microgravity has on the body during space flight
- **Bioastronautics** is the study of life in space
- “Seven national space programs have flown animals into space: The Soviet Union, the United States, France, Argentina, China, Japan, and Iran” (“Animals in Space” 1).
- USA: launched two flights with monkeys; one in 1969, and the other in 1985
- France: launched two flights with monkeys in 1967
- “During the 1950s and the 1960s, the Soviet space program used a number of dogs for suborbital and orbital space flights. Two tortoises and a variety of

insects were the first inhabitants of earth to circle the moon, on the 1968 Zond 5 mission” (Berger 1).

- Animals had been used in aeronautic exploration since 1783 when the Montgolfier brothers sent a sheep, a duck, and a rooster aloft in a hot air balloon (the duck serving as the experimental control) (“Animals in Space” 2).
- The first animals sent into space were fruit flies aboard a U.S.-launched V-2 rocket (...) The purpose of the experiment was to explore the effects of radiation exposure at high altitudes. (...) The fruit flies were recovered alive. Other V-2 missions carried biological samples, including moss (“Animals in Space” 2).
- The death rate when using monkeys during the 1940s was extremely high. About two-thirds of all monkeys sent into space either died during or soon after their missions (“Animals in Space” 2).

Introduction:

Following the concepts of the *Hidden Figures* nonfiction piece, I have created a lesson plan for your students to discover their own type of hidden figures, but with a furry twist. My hope is that your students learn more about the hidden animal figures that contributed to not only the space race, but all of science. This week will show students that even the smallest animals have had a large scientific impact.

This assignment asks students to choose, research, and present their findings about an animal of their choice and its contributions to science, and, more specifically, how the animal was used for experimentation in space. The students can present their findings through one of four methods mentioned below, and can use any materials found around their home, community, or school.

This project is designed to work for middle-school students with varying levels of access to technology. Everyone should be able to complete this project, regardless of their ability to access or use technological tools.

The assignment below includes handouts and project expectations, along with some information I found through my research into animals in space.

This project relies on multimedia platforms, so keep that in mind when applying this to your personal classroom. Students must clear animal choices with the teacher first, and are allowed to overlap on animal choices, but must not overlap on experiments. To clarify, two students can choose to research rats, but one student must look at rats in space and the other must look at research regarding rat heart rates compared to humans (same animal, different experiments). Students are researching an EXPERIMENT, not every single instance that their particular animal was shot into space. Good luck with this project! It should be a ton of informative fun for you and your students!

Objective: Communicate the concept of history's hidden animal figures by allowing students to choose an animal that has been to space, and create a presentation from the four presentation formats provided.

Time: 1 week (5 45-minute class periods + a weekend)

Materials: online databases, laptops, library computers, library materials/books, approved online secondary sources, projector (if showing PowerPoint/Prezi presentations to class)

Procedure:

Monday:

- 10 minutes: Introduce the concept of animals used in space.
 - See teacher notes and introduction for some discussion topics
- 5 minutes: Show the following YouTube video: <https://www.youtube.com/watch?v=0byb86LIF8U>
- 10 minutes: discuss the video - find out what excited students about the information provided
- 5 minutes: discuss with students the possible contributions animals made to science (without any research, just off the top of their heads)
- 5 minutes: introduce the bare bones of the project (deeper discussion will be on Tuesday)
- 15 Minutes: Use this time to allow students to generate three animals of their choosing to research the project. They do not have to have their project totally

figured out at this point, but having three animals to choose from is a great way to start the research process because it gives them options.

Tuesday: (This day is unnecessary if you choose to not use technology; this project can be adapted for low-tech classrooms)

- Technology day
- 15 minutes: introduce Prezi - show examples
<https://www.youtube.com/watch?v=vCkvy4Gvqw8>
- 5-7 minutes: Explore the prezisite with the students: answer questions
 - Flow: flowvella.com/s/5x5p (iPad)
 - Flowvella is an iPad alternative to Powerpoint. It is much easier to use than Powerpoint, and has the capability to be more fun for children. The app is very simple and easy to use, with a built-in tutorial option. Students can use this app to upload their projects to the Flowvella online cloud (for free) and present from either the cloud or their personal iPads. This app, however **only works for iPad capable schools**. If your students do not have access to iPads, ignore this option.
- 15 minutes: Introduce PowerPoint: go over the basics with the students
- 10 minutes: hand out project details
- Homework: Look over the handout and gather any questions, whether they be about research or the project in general, for the project (view handout at the bottom of this lesson plan)

Wednesday:

- 10 minutes: answer questions students might have from last night's homework
- 30 minutes: discuss other presentation options (give examples) (children's picture book - kinesthetic; movie - visual; speech - auditory)
 - Children's picture book
 - Students can create a picture book for younger ages where they discuss how their animal is a hidden figure in the science world
 - Movie
 - Students can create an iMovie (if applicable) following the story of their chosen animal and its contributions to science
 - Speech

- Students can write up a speech detailing their animal's contributions to science, and present it to the class as a public speaking project
- Homework: Begin researching your animals and be prepared to visit the library tomorrow

Thursday:

- Working day: library
- Take the students to the library for the entirety of the class
- They can use any resources the library has available, and they must fill out the attached "In Class Research" handout
 - Handout counts for a 10-point activity grade independent of the research project
- Homework: Fill out the activity, if not completed in class

Friday:

- Working day: library
- Take the students to the library once more and repeat Thursdays procedure.
- At this point, students should be close to finished with their research
- Homework: Finish the project, and be ready to present on Monday

Monday:

- Presentations (might run into Tuesday and Wednesday depending on length. Plan for this in following week's lesson plan)

Possible options: Prezi (tactful), children's picture book (kinesthetic), movie (visual), speech (auditory)

Furry Hidden Figures

Due: One week from today - (next Monday)

Objective: To teach the class about a hidden animal figure of your choosing, and its contributions to the field of science

Students! Show us your creative side. For this project, you'll find out more about an animal of your choosing and its role in the space program. You can choose a pet, a wild animal, or anything else that piques your interest. The first step for you is to choose an animal and clear it with me first. I can be contacted either in class or by email. Once I have approved your choice, you may begin researching your animal.

We will have two research days in class, but the rest is up to you. You may use any resources at your disposal: books, library resources, and testimonials from sciences teachers around school. Think outside of the box! After all, these are **hidden figures** we're researching, so it should require a little investigation.

It will be your job to teach the class (and me!) about what you have discovered. You may present your project through one of the four listed platforms:

1. Prezi/Powerpoint (minimum of 5 slides)
2. Children's book (minimum of 6 pages)
3. Movie (at least 2-3 minutes)
4. Speech (at least 2-3 minutes)

Choose a presenting format that shows your personal strengths, as each type of presentation will be graded differently. As long as you include quality information (at least 5 solid facts), and present it in a creative way, there is really no way to do this project incorrectly.

Good luck students, and most importantly, have fun with this project! It is not meant to stress you out. It is meant to inform and embrace creativity!

In Class Research Handout

Due: Friday, in class

<p>To what part of science did your animal mainly contribute? (ex: space race, genetics, etc.)</p>	
<p>What were the experiments performed? Was there more than one? (Did they use your breed of animal for multiple experiments?)</p>	
<p>Was your animal used once? Twice? Numerous times during the experiments?</p>	
<p>What country mainly used your animal in their experiments?</p>	
<p>What were the results? List any extra, interesting information here</p>	

Notes for teacher

- Research notes
 - Use databases
 - NASA website
 - Keywords: “animals” “NASA” “space animals” “space Dogs” “space rats” etc
 - YOUTUBE
 - TONS of videos about animals in space and animal contributions to science
 - Look up “space Dogs” for a very cute video!
 - Worldcat library database
 - Mary Roach *Packing for Mars*
- Article by Colin Burgess and Chris Dubbs
 - Acknowledgement: “to those countless unknown and unnamed animals whose lives were sacrificed in paving a safer path for humans to follow into space” (27).
 - The authors note that there are various animals used in NASA research, but dogs were a new realization for me.
 - The research turned up a photo of the cutest pup dressed in a Halloweenesque space suit. However, this St. Bernard was not celebrating a holiday, he was using his massive lungs to give researchers an idea of how pressure would affect human lungs (90).
 - This source has a ton of information regarding unlikely animals, like dogs, that can help the space race from the ground or the atmosphere.
 - Hamsters, chimps, monkeys, rats, cats, and dogs alike all have a purpose in the eyes of NASA.
 - The source also notes, regrettably, that most of these animals gave their lives for the interstellar cause.
 - This source acknowledges that Russia had been using dogs, against the protest of its citizens and animal rights organizations, as test subjects for suborbital flights.
 - These dogs were referred to as the “Satellite Dogs,” and their participation in the space race slowly turned from suborbital to orbital, as the researchers chose which species of dog would be the first into space.
 - They subjected these dogs to horrifying tests, like low illumination in cramped cages, while trying to prepare them for space travel (151).

- This article is extremely beneficial into looking at these inhumane practices versus the research benefits that these animals brought about.
- Rae Palotta Article
 - Rae Paoletta proposes an interesting article regarding the first cat in space, and his successful return back to Earth alive.
 - This cat's name was Felicette, and she was actually the replacement for the first space cat, who went missing before his inevitable take off.
 - The article notes, "After her landing, French scientists at the Education Center of Aviation and Medical Research (CERMA) studied Félicette's brain waves to see if she had changed at all since her voyage.
 - While not much is known about their findings—or about Félicette's eventual fate—the CERMA said she had made "a valuable contribution to research" (1).
 - They nicknamed her "Astrocat," and while her contributions were substantial, her memory has been lost along with France's participation in the space race.
 - This article also notes the following information that corresponds with other information from sources I have acquired: "Laika the [Soviet] dog led directly to Yuri Gagarin becoming the first human in space, which led to Alexey Leonov becoming human to spacewalk," Pearlman said.
 - "Monkeys Able and Miss Baker led to the first American flights that took heroes like John Glenn and Alan Shepard into space" (1).
 - The article also notes why domesticated animals are no longer used for space travel when the author writes: Though some animals, like mice, are still sent into space, society has largely shifted away from testing the effects of spaceflight on domesticated animals. The next time we'll see cats in space is likely when humans are living in space" (2).
 - This article provides a lot of useful information towards the history of felines in space, and it also provides a lot of outside citations that make this source credible.

Works Cited

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