

Introduction to the One Health Initiative

Description

Did you know 260 million Americans have health coverage? However, 124 million people have hypertension and prehypertension, 107 million are overweight, 105 million are obese, 81 million adults have a cardiovascular disease, 70 million have pre-diabetes, 23 million asthmatics and 21 million people have sleep apnea. These are all chronic conditions. 1 in 3 Americans have more than one chronic condition. On average, Americans only see their doctor 4 times a year. The number of people who have multiple chronic conditions is also staggering; 7% of people 0-17 years of age, 18% of people from ages 18-44, 49% of people from ages 49-64, and 80% of people from ages 65 and older.

Many of these chronic conditions come from our environment. Humans, animals, and all living organisms are connected with the environment in which they live. Our health and lifestyle impact the environment and organisms around us. This concept is known as the One Health Initiative. This lesson introduces students to the concept of One Health by applying different diseases, infections, and issues to humans, animals, and their environment. Students must take examples of One Health and try to come up with their own definition. They also must research and present their own One Health example with statistics of how it impacts humans and animals. In addition, introducing concepts like ecosystems to students, this lesson is also intended to be used as a way to get students interested in NC State ASSIST Center's One Health Challenge. This gives students an opportunity to be informed about diseases, infections, or other health problems, and to get them to solve a One Health related issue by creating a wearable device to monitor human and animal health.

Packet Contents

- [Introduction](#)
- [Curriculum Alignment](#)
- [Objectives](#)
- [Time and Location](#)
- [Teacher Materials](#)
- [Student Materials](#)
- [Safety](#)
- [Student Prior Knowledge](#)
- [Teacher Preparation](#)
- [Activities](#)
- [Assessment](#)
- [Critical Vocabulary](#)
- [Author Information](#)

Lesson Plan Tags

Check the standards that are met in your lesson plan, check all that apply.

☒ Middle School ☒ High School ☐ 6th Grade Science ☐ 7th Grade Science
☒ 8th Grade Science ☒ Middle School Math ☒ Middle School CTE ☒ Biology
☐ Chemistry ☐ Physics ☐ Energy Harvesting ☐ Anatomy ☒ Other High School Science
☒ High School Math ☐ HS Family and Consumer Science ☐ HS BFIT ☐ HS Marketing & Entrepreneurship ☐ Agriculture ☒ HS Technology ☐ Trade & Industrial ☒ Health Science

Introduction

This is an introductory lesson with the goal of getting students informed about One Health and understanding the importance of the One Health Initiative. Students will use data to back up the idea of how humans, animals, and the environment are interconnected.

Students will learn about One Health, zoonotic diseases, ecosystems, qualitative data, quantitative data, sample, population, and survey. Most of the students' time will be spent identifying and researching an example of a One Health topic.

Curriculum Alignment

Common Core State Standards for High School Mathematics:

CCSS.MATH.CONTENT.HSS.IC.B.3

Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

CCSS.MATH.CONTENT.HSS.ID.B.5

Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.

Common Core Mathematical Practice Standards:

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Common Core English/Language Arts Standards for Grades 9-10:

CCSS.ELA-LITERACY.RST.9-10.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9-10 texts and topics*.

- CCSS.ELA-LITERACY.RST.9-10.5 Analyze the structure of the relationships among concepts in a text, including relationships among key terms.

- CCSS.ELA-LITERACY.RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
- CCSS.ELA-LITERACY.RST.9-10.8 Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

High School NC Technology Essential Standards:

- HS.SI.1 Evaluate resources needed to solve a given problem.
- HS.TT.1 Use technology and other resources for assigned tasks.
- HS.RP.1 Design project-based products that address global problems.
- HS.SE.1 Analyze issues and practices of responsible behavior when using resources.

Biology NC Essential Standards:

- Bio.2.1.1 Analyze the flow of energy and cycling of matter (water, carbon, nitrogen and oxygen) through ecosystems relating the significance of each to maintaining the health and sustainability of an ecosystem.
- Bio.2.1.2 Analyze the survival and reproductive success of organisms in terms of behavioral, structural, and reproductive adaptations.
- Bio.2.1.3 Explain various ways organisms interact with each other (including predation, competition, parasitism, mutualism) and with their environments resulting in stability within ecosystems.
- Bio.2.1.4 Explain why ecosystems can be relatively stable over hundreds or thousands of years, even though populations may fluctuate (emphasizing availability of food, availability of shelter, number of predators and disease).

Earth/Environmental Science NC Essential Standards:

- EEn.2.7.1 Explain how abiotic and biotic factors interact to create the various biomes in North Carolina.
- EEn.2.7.2 Explain why biodiversity is important to the biosphere.
- EEn.2.7.3 Explain how human activities impact the biosphere.

Objectives

- Students will define the concept of One Health in their own words.
- Students will use technology to research One Health.
- Students will research statistics dealing with a One Health topic.
- Students will be able to differentiate between data that is qualitative and quantitative.
- Students will report their findings in a formal presentation

Time & Location

This lesson will take two 90-minute high school block periods or three 60-minute middle school periods to complete. Location depends on your school and technology resources. You can use a laptop, Chromebook, iPad cart, or computer lab.

Teacher Materials

- [Warm-up sheet](#) (There is NO answer key because answers will vary)
- [One Health PowerPoint](#)
- [One Health Grading Rubric](#)
- Laptop
- Projector
- Internet access (preferably Wi-Fi)
- Class set of computers/laptops/Chromebooks/iPads connected to internet
- Clicker or Wireless Mouse (optional, but recommended)
- Power Strips and extension cords (option). This would depend on the technology available at the school and the number of plugs in the space you are using the technology.

Student Materials

- [Warm-up sheet](#) (This is made so that you could copy it in half sheets)
- [One Health Questions/Research Worksheet](#)
- [Peer Review Rubric Sheet](#)
- [Reflection Sheet](#)
- Writing Utensil (preferably pencil or blue/black pen)
- Access to internet using some sort of device (see teacher materials above)

Safety

Remind students of appropriate internet use. The teacher needs to make sure they have completed the [Common Sense internet training](#) prior to this activity. Make sure you have appropriate consequences in place and that they are communicated to students. Discussion with administration before doing this lesson is always recommended.

Student Prior Knowledge

In 6th and 7th grade Science, students looked at abiotic factors of biomes and the impact the environment and lifestyle choices make on biological inheritance and survival. In 8th grade Science, they focus on ecosystems and how food, water, shelter, and space affect populations. They also talk about producers, consumers, and decomposers. They even talk about how the flow of energy is interconnected with food webs.

In 7th grade Mathematics, students went through the concepts of sample, population, and representative samples to form inferences.

In 8th grade Technology, students evaluate information resources based on specified criteria, they use technology and other resources for assigned tasks, they apply a research process to complete project-based activities, and analyze responsible behaviors when using information and technology resources.

Teacher Preparation

1st Day: Make sure that the [PowerPoint](#) is uploaded to the computer and the projector is connected to the computer. The teacher will make sure to copy the [Warm-up sheet](#) and research sheet for each student.

Activities

Day 1 - 90 minute block:

1. Warm-up (5-7 minutes)

- The teacher will (TTW): Pass out the [warm-up sheet](#). Give students about 5-7 minutes for students to complete.
- The students will (TSW): Complete the [warm-up sheet](#) to the best of their ability.
- TTW: Go over the [warm-up sheet](#) after students have been given 5-7 minutes to work. The teacher can decide whether or not he or she wants to collect the warm-up sheet.

2. Introduction to One Health (10-15 minutes)

- TTW: Project and discuss the concept of One Health through the [PowerPoint](#).
- TSW: Participate in an active discussion while teacher facilitates the [One Health PowerPoint](#). Possible questions to ask could be:
 - Does anyone know what zoonotic means?
 - What are current event health issues?
 - How did these health issues begin?
 - Why did they become a problem?
 - What are some uses of animals besides for food or pets?
 - What are some changes in our environment that affect the health of humans or animals? Are these major issues?

3. Partner work (rest of the period/block)

- TTW: Assign student pairs to work on their own One Health research. TTW make sure to explain to the students exactly what they are expected to do as stated on the [One Health Research Sheet](#).
- TSW: Read instructions, listen to the teacher, and ask questions for further clarification.
- TTW: Circulate the classroom to make sure students are working on the One Health Research Sheet and to clarify any questions or concerns that arise. Keep in mind that if you keep getting the same questions over and over again from students, it might be a good idea to pull the groups back together as a class to answer the questions.
- TSW: Work with their partner researching and defining specific terms.

4. Bring the group back together & Clean-up (7-10 minutes)

- TTW: Get the class's attention and then make sure the students understand what they are to have completed by the middle of next class. Also, give them 5-7 minutes to clean up, log out, return any laptops, etc.
- TSW: Repeat back what they need to have completed by the middle of next class. They will return any laptops, log out, and do any procedural things to make sure technology is returned in the expected procedure.

AIG Modification for Day 1: AIG students could go through the [PowerPoint](#) on their own and then proceed to the assigned activity. They could already be paired off, and be more reliant on each other in the pair instead of teacher-centered instruction.

ELL Modification for Day 1: After students define the key vocabulary on the student sheet, have them circle words in the definition they do not understand. Go through those words as a class and have students take notes on those particular words. See if they could draw pictures to represent the vocabulary. Use language dictionaries to help with translation.

Day 2 - 90 minute block:

1. Group Research Time (45 minutes)

- TTW: Have students sit in their pairs. Remind students the instructions on the [Research sheet](#). Let them know you will pass out a [peer review sheet/rubric](#) while they are working. They need to be ready to present/complete peer review sheets in 45 minutes. Students can also complete peer review sheets as homework, if there is a time constraint.
- TSW: Students will continue to work on their assignment in pairs and be ready to present their findings and complete their [peer review rubric](#) sheets for other groups in 45 minutes.
- TTW: While students are working, the teacher will circulate the classroom to answer questions and make sure students are ready to present.
- *Note: If this is completed in a computer lab, you might have to return to your classroom to complete presentation time. Keep this in mind when putting aside time for presentations and group feedback.

2. Presentation Time/ Group Feedback (25 minutes) **This could be longer/shorter depending on the numbers of pairs/individuals you have and the amount of feedback you allow to be shared.

- TSW: Each pair will present their definition of One Health, and an example of One Health in today's lifestyle using statistics.
- TTW: Grade each pair using the [One Health Grading Rubric](#).
- TSW: While each pair is presenting, it is expected that each person fills out a [Peer Review/Rubric](#). When the pair is finished, students will be expected to share at least one positive and one thing that could be improved.
- TTW: Time students and try to keep students to a specific time frame. The teacher will also facilitate the [peer review](#) back to the groups. He or she will make sure the environment stays respectful during this time.
- TTW: At the conclusion of presentations, the teacher will collect all students [peer review/rubrics](#) to show students how they would have done if graded by their peers.

3. Reflection (10 minutes)

- TSW: Complete a [reflection](#) about what they did well and what they could have done better. Once they are finished, they will clean up any necessary areas.
- TTW: Collect these [reflections](#) as an exit ticket out the door.

AIG Modifications for Day 2: AIG students could probably have a shortened time frame or their rubric could be modified to grade them on their actual presentation skills. They could also be required to find more than 1 example of a One Health topic.

ELL Modifications for Day 2: Make sure English Language Learners have the time to do research. This might take extra days. Also, I would make sure they have language dictionaries for support. Plus, you could even modify the assignment by giving them definitions instead of having them define the words themselves.

Other Modifications for Day 2: Keep in mind that depending on your technology resources, time frame, etc. this could take longer/shorter than what is on this lesson plan.

Assessment

- Use the [One Health Grading Rubric](#) for grading as an assessment of whether or not the students understand One Health and the type of statistics they found.

Critical Vocabulary

Science-Related Vocabulary:

Zoonotic Diseases- diseases that can be spread between humans and animals.

Ecology- a branch of Biology that focuses on relationships between organisms and their surroundings.

Ecosystem- a community of interacting organisms and their physical environment.

Infection- spreading germs from one organism to another.

Bacteria- one-celled organisms, spherical, spiral, or rod-shaped and appearing singly or in chains, ... of which are involved in fermentation, putrefaction, infectious diseases, or nitrogen fixation."

Virus- an ultramicroscopic (20 to 300 nm in diameter), metabolically inert, infectious agent that replicates only within the cells of living hosts, mainly bacteria, plants, and animals.

Bacterial Infection- an infection containing bacteria. Bacterial infections can be stopped by the use of antibiotics.

Viral Infection- an infection caused by a virus. Viral infections cannot be stopped by the use of antibiotics.

Vector-borne infections- diseases transmitted to humans, animals, or plants by insects.

Cancer- disease caused by abnormal division of cells

Cardiovascular Diseases- diseases that affect the heart; usually with narrowed or blocked blood vessels

Comparative Medicine- "a distinct discipline of experimental medicine that uses animal models of human and animal disease in translational and biomedical research."

Math-Related Vocabulary:

Categorical/Qualitative Data- data that can be described through categories and not through values (examples: gender, religious preference, favorite color)

Quantitative Data- data that can be expressed as a number (examples: age, number of hours spent studying, mass of an object)

Sample- one or more observations from a population.

Population- the total set of observations that can be made

Survey- an investigation about the characteristics of a given population by means of collecting data from a sample of that population and estimating their characteristics

Author Information

Kenan Fellow: Annie Polashock

- CE Jordan High School, Durham Public Schools, Durham, NC
- Mathematics - Math 1, Math 2, and Essentials of College Math
- 5 years of Teaching Experience
- apolashock@gmail.com

Mentor: Dr. Elena Veety

- North Carolina State University ASSIST Center
- ASSIST Education Director
- Ph.D. in Electrical Engineering from North Carolina State University
- enicole@ncsu.edu