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| **Description:** The One Health Initiative is a local, national and global collaborative effort of multiple disciplines to attain optimal health for people, the environment, and animals. In this lesson plan, students complete the One Health Challenge. They will use their knowledge, skills, and interests to try and make a positive global impact by brainstorming, designing, and marketing a wearable device to monitor a health condition for humans, animals, or the environment. | **Lesson Plan Tags:** **☒** *High School CTE* **☒** *High School Project Management***☒** *High School Marketing & Entrepreneurship* |
| **Introduction:** In this lesson plan students will begin the project life cycle with the initiate and planning phases. Students will be put into teams and begin brainstorming ideas to solve a real world problem that aligns with the One Health Challenge. Students will learn to use critical thinking, problem solving and teamwork skills to identify a global health problem, and a solution to that problem. By the end of the project, students will have a better understanding of the initiating and planning stage of the project life cycle, understand the purpose of a project charter and scope statement, and learn to market an idea. |
| **Curriculum Alignment:** *Attached Below* |
| **Objectives:** * Students will understand the project life cycle.
* Students will read and interpret a project charter.
* Students will collaborate with other students in the classroom.
* Students will apply critical thinking and problem solving skills to solve a real world problem.
* Students will use brainstorming techniques as a team.
* Students will market their design.
 |
| **Time & Location:** * Lesson is done in a classroom with computer access.
* Lesson is planned for 3-5 days in an 84 minute block scheduled class.
 | **Safety:** * Maintain an orderly and safe environment for students to work.
 |
| **Teacher Materials:** *The following handouts are included in the lesson plan:** Project Charter – Initiates the project
* Top 20 Ideas Worksheet – Graphic organizer for ideas
* What is an Arduino Worksheet – Arduino basics information
* Project Scope Statement – Provides scope of the design
* One Health Project Rubric
* Product Presentation Rubric
* Team Daily Log Template – Daily team plans
 | **Student Materials:** Bring any of the following of students to brainstorm:* Whiteboard Section/Large Paper for each group
* Dry Erase Markers/Makers for each group (colored)
* Post its/Index Cards (colored)
 |
| **Student Prior Knowledge**:* The Project Life Cycle Basics (Initiating, Planning, Executing, Monitoring and Controlling, and Closing)
* Understand a project charter and scope statement
* Understand brainstorming techniques
* Understand Microsoft Office Products (Word & PowerPoint)
 | **Teacher Preparations:** * Students should be put in groups with varying skill sets. Take into account skills, personality, computer knowledge, hands on skills, etc. You can allow team members to assign themselves roles, or you can do it for them. You will need one Project Manager in each team.
* Try to separate teams so they have space to work.
 |
| **Assessment:** * Each team must have 20 ideas for product (quick check for completion and creativity).
* Team will create a scope statement and blueprint for their final idea.
* Team will create a “sales pitch” for their idea through a 5 minute presentation.
* Daily Activity Log (checked daily through project leader meetings)
 | **Critical Vocabulary:*** Project Life Cycle
	+ Initiating, Planning, Executing, Monitoring and Controlling, Closing.
* Project Charter
* Project Scope Statement
 |

**Curriculum Alignment**

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| *Project Management Standards** *1.01 Understand the five processes of project management, individually and collectively (B2).*
* *1.03 Understand how to conduct web-based research that yields valid and reliable information (B2).*
* *5.01 Compare the relative value of optimization and maximization when determining the scope and cost of projects (B2)*

*Common Core State Standards** *CCSS.ELA-Literacy.CCRA.R.1 - Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.*
* *CCSS.ELA-Literacy.CCRA.R.2 - Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.*
* *CCSS.ELA-Literacy.CCRA.R.10 - Read and comprehend complex literary and informational texts independently and proficiently.*
* *CCSS.ELA-Literacy.W.9-10.1 - Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.*
* *CCSS.ELA-Literacy.W.9-10.6 - Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology’s capacity to link to other information and to display information flexibly and dynamically.*
* *CCSS.ELA-Literacy.W.9-10.7 - Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.*
* *CCSS.ELA-Literacy.SL.9-10.1 - Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.*
 |

**ACTIVITIES**

|  |  |
| --- | --- |
| **Activities** | **Notes** |
| 1. Allow students to individually research the [One Health Challenge](https://assist.ncsu.edu/wearable-device/) *(5-7 minutes).*2. Play the following videos related to [One Health](https://www.youtube.com/watch?v=TG0pduAYESA&feature=youtu.be) and [Wearable Devices](https://www.youtube.com/watch?v=wI8TNCMg2gA&feature=youtu.be).3. After the research and video, began a classroom discussion. On the board write “What is the One Health Challenge?” Allow students to provide input on what they know *(5-7 minutes).****Teacher Note:*** *By the end, students should understand the One Health Challenge.**You may use this example to get the students thinking:**A Football Concussion device. A device that would notify a player that he may have a concussion after a specific hit.*  | *-After the research, video and discussion, students should understand the objective of the One Health Challenge.***- One Health Challenge Objective:** Create a wearable device that can help solve a health issue for humans, animals, and/or the environment.- The videos will help get the students attention and further explain One Health and wearable devices. |
| 1. Speak about the brainstorming process with the students *(5-10 minutes).* 2. **Practice Brainstorming Activity (10-15 minutes):** On the board write the question “How to improve the school experience”. Ask students to brainstorm ideas on how this can be done. ***Teacher Note****: As the teacher, write down all ideas on the board using a graphic organizer of your choice. Once the students run out of ideas, begin finalizing down the ideas to the best/most reasonable as a class.****Optional Video****:* [*The Deep Dive*](http://ed.ted.com/on/pFQcTRTn) *(20 minutes) – Excellent video showing a corporate culture of product development, and their brainstorming techniques. I highly recommend the video. Video can be shown before or after the practice activity, or as homework.* | ***Depending on the students’ familiarity with brainstorming, you may have to spend a bit more time with it.***- Discuss with the students that brainstorming is the process for generating a lot of ideas about a given topic or problem. Students should understand that all ideas should be considered in this process.- Students can use any technique they choose (mind mapping, post its, graphic organizers, etc.).- During the practice activity make sure to show the students all ideas will be written down. Show the students how more ideas come from other ideas that were given. - The deep dive video is a great resource to show the students. In the video, a company called IDEO uses brainstorming techniques to develop a new shopping cart. |
| 1. After students understand the brainstorming process, you can put the students into teams of 3-4 to complete the **One Health Challenge.**2. Pass out **DOCUMENT A: ONE HEALTH PROJECT CHARTER**. Please read through the project charter with the students. This will give them an overview of the challenge, due dates, goals and requirements for the project.3. Next pass out **DOCUMENT C: WHAT IS AN ARDUINO?** Go over the document with the students. This is the basis for their wearable device.***Teacher Note:*** *Make sure students understand the basic concept of an Arduino. It is a small microcontroller that takes an input and products an out. Students will use this device to design their wearable device. Also direct students to* [*sparkfun sensors*](https://www.sparkfun.com/categories/23?page=all) *to give then an idea of the types of sensors that can be used.* ***Example Idea for the One Health Challenge and use of sensors:*** *We will be using force sensors and place them around a football helmet to measure impact. If they impact is high enough, an LED will light up showing the referees that this player may have a concussion.*4. Ask students if they have any questions regarding directions, or the Arduino. Once all questions are answered, you may begin the brainstorming process. 5. Next pass out **DOCUMENT G: TEAM DAILY LOG.** Students will begin discussion roles and general schedule/plans for the day. Today’s goal is to begin brainstorming ideas for the One Health Challenge.6. Once a team is ready, provide each team a large whiteboard or large sheet of paper that will allow them to write down all of their ideas and pass out *(45 – 75 minutes).* Their goal is to come up with a minimum of 20 ideas.7. After the students come up with 20 ideas on their whiteboard/paper, pass out **DOCUMENT B: TOP 20 IDEAS** for the team to fill out. ***Teacher Note:*** *You are looking for creativity and a general description of the product that they plan on building. An example is provided on the worksheet.* | - In this activity, students will begin brainstorming ideas for the One Health Challenge. You can allow as much time as necessary. I recommend starting on Day 1, and continuing onto the next day for a short period of time. This allows them to go home and think of more ideas if necessary.- The goal is for students to brainstorm up to 20 ideas for a wearable device that will help solve a health initiative. Eventually narrow down their choice to one. The students will plan on using an Arduino and sensors to design this wearable device.- Once students gather their 20 ideas, allow them to write them down on **DOCUMENT B: TOP 20 IDEAS**. Here students will write the idea, and a description of what the device they will create for it. This can be a basic description on what it will do. An example is provided on the document.- The **DOCUMENT G: TEAM DAILY LOG** will be filled out daily. Give the teams about 5-7 minutes every day to fill out the form. It helps them organize their daily plans, team roles, and project progress. While not necessary, it helps them stay a bit more organized. |
| 1. After you have approve the top 20 ideas, the team can now begin the process of narrowing down to a single idea for the One Health Challenge. Allow students to research ideas and see which ideas are feasible. ***Teacher Note:*** *After students pick one idea, they will begin creating their scope statement, design and “sales pitch”.* | - Students will then narrow down their top 20 ideas into one idea. During this process begin dismissing ideas that may not be suitable, and researching ideas they are interested in. This will allow them to slowly narrow down their choice. |
| 1. Once students choose an idea, they can begin in depth research to complete the scope statement. This will provide a low level description of the product.2. Once the scope statement is complete, students can begin designing the product. They can be computerized or by hand.3. After the scope statement is complete and product is designed, students can begin planning a “sales pitch” for their product. ***Teacher Note:*** *During this process students should be intensely researching their health topic, and sensors they plan on using. Teams should also decide on how they want to “pitch” their idea. It does not have to be a typical PowerPoint.* *At the end, utilize* **DOCUMENT E: ONE HEALTH PROJECT RUBRIC** to grade the Top 20 Ideas, Scope Statement, Group Work, & Product Design. | - A Scope Statement helps describes the product in specific detail. Students will have to describe the product, and its constraints, exclusions, criteria, estimate costs, and a variety of other factors that help develop the scope of a product. Allow them to fill in the template provided.- The design can be computerized or hand drawn. You should get a general visual idea of what the product will look like. You are looking for a rough draft design. You can increase rigor depending on the class and skills of the students.- By the end of this section, you should be able to read their scope statement and look at their design, and understand what the product is, and what it should do.  |
| 1. Lastly hold presentations. You can incorporate a voting system to vote for the best idea.***Teacher Note:*** *To grade the presentations, utilize* **DOCUMENT F: PRODUCT PRESENTATION RUBRIC** | During presentations, ask the class to take notes on all groups. Create an anonymous voting system at the end of class to vote the best product idea! |

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| **Author Information** |
| ***Panagiotis Peter Styliadis****Panther Creek High School, Wake County**High School CTE (MSIA, SAS, Project Management)**Full time teacher since 2014**pstyliadis@wcpss.net* | ***Dr. Jur****NC State University**LEADER OF THRUST V**Assistant Professor in the College of Textiles* *jsjur@ncsu.edu* | ***Dr. Veety****NC State University**EDUCATION DIRECTOR**Teaching Assistant Professor, Department of Electrical and Computer Engineering**enicole@ncsu.edu* |

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| **One Health Project Charter****Project Purpose** [**(https://assist.ncsu.edu/one-health/**](file:///C%3A%5CUsers%5Cpstyliadis%5CDesktop%5CKenan%20Lesson%5C%28https%3A%5Cassist.ncsu.edu%5Cone-health%5C)**)**The challenge is to design a wearable device for a human, animal or the environment to solve a global health problem utilizing the One Health Initiative. |
| **Project Goals*** Team comes up with 20 ideas for a wearable device that follows the One Health Challenge.
* Team designs a blueprint (hand drawn or computer) of their idea and completes a scope statement.
* Students will “Sell” their plan to a board. Only one product will be chosen. You will have 5 minutes to sell your plan (not including Q & A).
 |
| **Project Requirements*** Students use an Arduino and sensors ([sparkfun](https://www.sparkfun.com/categories/23?page=all)) to create the device.
* Device is wearable for a human, animal or the environment.
* Students will research and understand the health problem they are attempting to solve.
 |
| **High Level Project Description**Students will be tasked with designing a wearable device to monitor the health of a human, animal or environment based on environmental factors and/or disease. Students will designing a device to complete the One Health Challenge using an Arduino and corresponding sensors. You can find a variety of sensors at [www.sparkfun.com](http://www.sparkfun.com).The students complete a scope statement and design a blueprint for the device, align with a sales pitch presentation to the class. |
| **Summary Milestones** |
| ***Milestones*** | ***Date*** |
| Project Start Date |  |
| Minimum of 20 ideas brainstormed |  |
| Product idea formed & approved |  |
| Design completed and presentation ready |  |
| **Summary Budget** Initial investment of $5,000. |
| **Project Approval Requirements*** Formal approval of 20 brainstormed ideas and final idea by the teacher.
* Formal approval of blueprint and scope statement.
 |

 **Key Stakeholders**

|  |  |
| --- | --- |
| Client  | NC State Assist Center |
| Sponsor | Teacher |
| Project manager | <Student Name> |
| Project team members | <Students> |

**Approval Signatures**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***NC State Assist Center*** |  |  |  |  |
| [Name], Project Client |  | [Name], Project Sponsor |  | [Name], Project Manager |

**­**

**Student Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| --- | --- | --- |
|  | **TOPIC** | **PRODUCT DESCRIPTION** |
| **1** | *Football Concussions* | *We are planning on attaching force sensors on the sides and back of a football helmet that will detect force. If a high enough force is detected a light will turn on warning the coaches of a possible concussion.*  |
| **2** |  |  |
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| **20** |  |  |

**ARDUINO BASICS –** The Arduino is an open source microcontroller. It essential reads a variety of sensors, analyzes the information from the sensors, then controls an output(s), such as lights, motors, buzzers, sounds, etc.

**Examples**

* **Reads a humidity sensor that is placed in a plant, then is programed to light an LED to let you know that your plant is dry and needs water.**
* **Use a motion sensor to tweet every time your dog passes through a pet door.**

**THE ARDUINO WILL TAKE A SERIES OF INPUTS USING A VARIETY OF SENSORS**

***SUCH AS:***

**Temperature Sensor**

**Push Button**

**Switch**

**Motion Sensor**

**Force Sensor**

**Sound Sensor**

PROGRAM YOUR ARDUINO TO CONTROL OUTPUT BASED ON CONDITIONS FOR YOUR INPUT

**THE ARDUINO WILL THEN CONTROL A VARIETY OF OUTPUTS**

***SUCH AS:***

**Online Social Media**

**LED’s**

**Sounds**

**Motors**

INPUTS



OUTPUTS

***References:***

*http://www.instructables.com/id/Intro-to-Arduino/*

*https://www.sparkfun.com/categories/23?page=all*

**PROJECT SCOPE STATEMENT**

*The degree and level of detail to which the project scope statement defines the work that will be performed and the work that is excluded can determine how well the project management team can control the overall project scope. The detailed project scope statement includes, either directly, or by reference to other documents, the following:*

**PRODUCT SCOPE DESCRIPTION**

*Progressively elaborates the characteristics of the product, service, or result described in the project charter and requirements documentation. Please attach your design to this document.*

**PRODUCT ACCEPTANCE CRITERIA**

*Defines the process and criteria for accepting completed products, services, or results.*

**PROJECT DELIVERABLES**

*Deliverables include both the outputs that comprise the product or service of the project, as well as ancillary results, such as project management reports and documentation. The deliverables may be described at a summary level or in great detail*

**PROJECT EXCLUSIONS**

*Generally identifies what is excluded as from the project. Explicitly stating what is out of scope for the project helps to manage stakeholders’ expectations.*

**PROJECT CONSTRAINTS**

*Lists and describes the specific project constraints associated with the project scope that limits the team’s options, for example:*

* *Predefined budget*
* *Imposed dates*
* *Scheduled Milestones that are issued by customer or performing organization*
* *When a project is performed under contract, contractual provisions will generally be constraints.*

*Constraints may be listed in the project scope statement, or in a separate log.*

**One Health Project Rubric**

**Student Names:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| --- | --- | --- | --- | --- |
| **One Health Project Rubric** | *All elements present* | *Most elements present* | *Some elements present* | *No elements present* |
| **Daily Activity Log** *- Team takes time at the beginning of every class to discuss progress, plans and individual roles.**- Team works together well, and each individual has a role (you can take points off individual students not participating).* | 4 | 3 | 2 | 1 |
| **Top 20 Ideas***- Team develops a minimum of 20 ideas for the One Health Challenge.**- Each ideas has a general description on what the idea entails, and how they would solve the issue.**- Students use creativity in the process.* | 4 | 3 | 2 | 1 |
| **Project Scope Statement***- Team describes the product in the scope statement in detail. Reader should be able to picture the product by reading the description.**- Acceptance criteria, deliverables, constraints, exclusions are all planned well. Reading the scope statement helps the reader understand the final scope of the product.**-Team uses correct grammar and punctuation.* | 8 | 6 | 4 | 1 |
| **Project Design***- Students create a basic design for their product to show how it would look, where it would be placed, and what type of sensors they plan on using.* | 4 | 3 | 2 | 1 |

**General Comments:**

**Product Presentation Rubric**

**Student Names:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONTENT** | *All elements present* | *Most elements present* | *Some elements present* | *No elements present* |
| **Introduction**1. Presentation begins with a clear Introduction to the project.
 | 4 | 3 | 2 | 1 |
| 1. Introduction of team and roles.
 | 4 | 3 | 2 | 1 |
| **Topic Development**1. Presentation is creative and students “sell” their idea. The teams answer the question, why is their party the best.
 | 6 | 4 | 2 | 1 |
| 1. Presentation shows full grasp and understanding of the project. Presentation provides information & evidence related to the project.
 | 4 | 3 | 2 | 1 |
| 1. Presentation uses well produced audio/visual aids or media to enhance understanding of findings, reasoning, or evidence.
 | 4 | 3 | 2 | 1 |
| **Conclusion**1. Conclusion highlights key ideas, transitions smoothly to ending, reviews presentation and concludes with a strong final statement.
 | 4 | 3 | 2 | 1 |
| 1. Presenters fields questions easily.
 | 4 | 3 | 2 | 1 |
| 1. PowerPoint within time limit.
 | 4 | 3 | 2 | 1 |

**GENERAL COMMENTS:**

*Time Start:*

 *Time End:*

**Team Daily Log**

**Project Start Date: *Click here to enter start date***

**Project Number:**

**Project Task:**

# Day 1: September xx, 20xx (example)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Team Member** | **Role** | **Role Description** | **What are you doing today?** | **Encountered any roadblocks?** |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**Team Summary:**

**On Schedule? Why or why not.**

# Day 2: September xx, 20xx (example)

|  |  |  |  |
| --- | --- | --- | --- |
| **Team Member** | **What did you do yesterday?** | **What are you doing today?** | **Encountered any roadblocks?** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Team Summary:**

**On Schedule? Why or why not.**