**Integrated STEM Plan: RPi Community Garden**

**Essential Question**: Can a group of students monitor a community vegetable garden more effectively than a Raspberry Pi 2?

**Enduring Understanding:**

1. Students will understand that maintaining a community vegetable garden can be accomplished with the use of a microcontroller (Raspberry Pi) and sensors.
2. Students will understand that a sense of community can be accomplished in a physical as well as a virtual environment.
3. Students will understand the importance of the Internet of Things.

**Essential / Inquiry Questions:**

1. Can environmental education benefit greatly from technological integration?
2. Can a group of students monitor a garden more effectively than a Raspberry Pi 2?
3. What should be managed and monitored to service a community vegetable garden?
4. How effective is a Raspberry Pi 2 at monitoring the garden?
5. What is a community vegetable garden?
6. What are the benefits of a community vegetable garden?
7. Can social media be used effectively to take care of the community vegetable garden?
8. How do data collections affect the maintenance of a community vegetable garden?
9. Is there still a sense of community when a garden is monitored by a Raspberry Pi 2?

**Materials:**

1. A plot of open space for planting vegetables
2. A variety of vegetable plants
3. Raspberry Pi 2
4. Raspberry Pi Sense HAT with gyroscope, accelerometer, magnetometer, temperature, barometric pressure, and humidity sensors (http://pythonhosted.org/sense-hat)
5. Portable computer
6. Internet access
7. Free Landscape Design Software (ie. Designor Buddy)
8. Composition notebook or tablet
9. Pencils (colored)
10. Websites:
    1. <http://ucanr.edu/sites/MarinMG/Community_Service_Projects/Marin_Community_Gardens/> (What is a community garden?)
    2. <http://www.gardendallas.org/benefits.htm> (Benefits of a community garden)
    3. <https://communitygarden.org/resources/10-steps-to-starting-a-community-garden/> (Steps to starting a community garden)
    4. <http://www.gardeners.com/how-to/vegetable-gardening/5069.html> (How to grow a vegetable garden)
    5. <http://www.designorbuddy.com/> (Outdoor design software)
    6. <https://www.raspberrypi.org> (Official Raspberry Pi site)

**Introduction:** Community gardens are a beneficial way to beautify an open space and to get local residents to work together for a common cause. Community gardens (1) allow for people to grow plants and produce through satisfied labor, (2) create a sense of togetherness with others and the environment and (3) help to enforce a healthy lifestyle through exercise and consumption of vegetables.

Creating, managing, and maintaining a community garden takes a lot of planning. Can the use of technology benefit this process?

**Direct Instruction:**

1. Introduce Environmental Education
2. Explain the concept of the community garden to students.
3. Ask students what a community garden should look like.

**Student Driven Learning:**

1. Vegetable Garden design
2. Garden management and maintenance
3. Data collection and analysis

**Assessment Evidence:**

1. Vegetable garden student designs
2. Data logging following the scientific method or collecting from the Raspberry Pi sensors
3. Data collection
4. Vegetable health and growth

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Very Likely** | **Somewhat Likely** | **Very unlikely** |
| 1. **How likely is the student to do well on the assessment?** |  |  |  |
| Making clever guesses, “plugging in” what was learned |  |  |  |
| Making a good-faith effort with hard work and enthusiasm |  |  |  |
| Producing a product or performing |  |  |  |
|  | **Very Likely** | **Somewhat Likely** | **Very unlikely** |
| 1. **How likely is the student to do poorly on the assessment?** |  |  |  |
| Failing to meet the requirements of the task |  |  |  |
| Not being skilled at the aspects of the task |  |  |  |