Investigating Computer Innovations in Agriculture

What is the impact of innovation in agriculture?

Background

Investigating the impact of existing computing innovations can help students avoid unintentional negative effects of their own innovations. Consumers should be aware of the impact that a new computing innovation might have before beginning to use it, as well as what data are being gathered and how the product owner intends to use those data. While students may find it relatively easy to describe how the gathering of data would impact them, it is sometimes more difficult for students to understand the impacts that computing innovations and the gathering of personal data might have on people who are different from them, or on society as a whole. As students investigate computing innovations, provide opportunities for students to learn from others' perspectives by allowing time for viewpoints and potential impacts to be shared during a group discussion. (AP CSP Course Framework p. 111)

BIG IDEA 1: Creative Development

>Topic 1.1 Collaboration

>SKILL 1.C Explain how collaboration affects the development of a solution

>LEARNING OBJECTIVE CRD-1.C Demonstrate effective interpersonal skills during collaboration.

ESSENTIAL KNOWLEDGE

CRD-1.C.1 Effective collaborative teams practice interpersonal skills, including but not limited to:

•communication

•consensus building

•conflict resolution

•negotiation

BIG IDEA 5: Impact of Computing

>TOPIC 5.1 Beneficial and Harmful Effects

>LEARNING OBJECTIVE IOC-1.A Explain how an effect of a computing innovation can be both beneficial and harmful.

ESSENTIAL KNOWLEDGE

IOC-1.A.2 The way people complete tasks often changes to incorporate new computing innovations.

IOC-1.A.3 Not every effect of a computing innovation is anticipated in advance.

IOC-1.A.4 A single effect can be viewed as both beneficial and harmful by by different people, or even by the same person.

Students will be asked to complete three investigations into computer innovations during the school year. Through these investigations, students will look at the data the computing innovation uses to complete its task; any data privacy, security, or storage concerns that might be associated with the

innovation; and beneficial and harmful effects the computing innovation might have on society, the economy, or culture. (AP CSP Course Framework p. 111)

SAMPLE INSTRUCTIONAL ACTIVITIES (AP CSP Course Framework pp. 112-113)

Topic 5.1 Beneficial and Harmful Effects

LEARNING OBJECTIVE: 5C Describe the impact of a computing innovation.

See Possible Sources at the end of this document.[1]

Activity 1 Marking the text
Provide students with an article that highlights both beneficial and harmful effects of a specific computing innovation.
1. Have them mark which effects are beneficial and which are harmful.
    a. For each effect the students mark as harmful, have them add notes about whether they think these effects should have been anticipated in advance.
    b. For each effect the students mark as beneficial, have the students make notes indicating if they think these benefits were intended or unintended.
2. Have them circle any information that is connected to data.

Activity 2 Jigsaw - Group activity
Provide the students with an article regarding the impact of computing innovation on agriculture.
1. Each person in the group reads an article about a different topic (Drones/UAVs, 3D printing, or mapping as it relates to agriculture), taking on the role of ¨expert¨ on what was read.
2. Students share the information from that reading with students from other groups and then return to their original groups to share their new knowledge.

Activity 3 Rapid Research - Group activity
Each group will research their assigned computing innovation and make three presentations to share with the group. (Time about 45 to 60 minutes)
NOTE: It is wise to assign roles for each group member. See Group Suggestions at the end of this document.[2]
1. Overview of topic using Google Slides - 30 seconds to a minute
    • Presentation must give an overview of the innovation, including the following:
        • Provide a summary of the article
        • Identify the impact of the innovation on people and society that you care about.
2. Two sentence review using Flip Grid - 30 seconds (https://info.flipgrid.com/)
    • What are the positive (+) and negative (-) impacts on society, economy, or culture? What do I want people to know about this?
    • Choose one of the sentence frames below for your second presentation:
        • It is clear that _____; therefore, _____. While others try to persuade you that _____, the evidence suggests that _____because _____.
        • Due to the fact that _____, it seems evident that _____ in order to _____.

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      3.Meme (https://www.canva.com/create/memes/) - about 10 seconds
- Make a tagline for your innovation and design a meme slide using your tagline.
- Once the meme is made, copy the URL address or take a Snip using the Snipping tool

[1]**POSSIBLE TOPICS and SOURCES**
Topics: Drones/UAVs, 3D printing, 3D Mapping, Hydroponics, Robotics, Self Driving Vehicles, Internet of Thing (IoT)

15 Agtech Startups to Watch in 2020
https://www.rocketspace.com/corporate-innovation/15-agtech-startups-to-watch-in-2020
Applying modern tech to agriculture
https://www.downtoearth.org.in/blog/agriculture/applying-modern-tech-to-agriculture-66017
How Will Drones Change Agriculture?
https://insideunmannedsystems.com/how-will-drones-change-agriculture/
How 3D Printing Helps Save Time in Agricultural Manufacturing
https://myfarmlife.com/equipment/how-3d-printing-helps-save-time-in-agricultural-manufacturing/
Top 5 tech innovations in agriculture
https://www.raconteur.net/sustainability/top-5-tech-innovations-in-agriculture#:~:text=One%20popular%20innovation%20in%20agriculture,farming%20in%20one%20recirculating%20system.
5 Innovative Agricultural Practices That Are Changing the World
https://disruptorleague.com/2018/08/06/5-innovative-agricultural-practices-that-are-changing-the-world/
Edge computing: A tractable model for smart agriculture?
https://www.sciencedirect.com/science/article/pii/S2589721719300339

[2]**Group Suggestions**
https://resilienteducator.com/classroom-resources/4-methods-to-enhance-student-collaboration-in-the-classroom/
"One of the goals of collaborative learning is to highlight the fact that all students have something to contribute, and finding the most beneficial role for them benefits the group as a whole. The Global Development Research Center recommends assigning specific roles to qualified students for specific activities they are suited for. Determining what tasks or duties students are predisposed to may take some time and observation. Some suggested roles within a group might be:
- Leader or manager: Responsible for keeping the group on-task and overseeing each component of the activity
- Secretary or recorder: Takes notes and the minutes of meetings
- Artist/Creative director: Makes drawings, diagrams or illustrations as needed
- Monitor: Watches the time, distributes and collects equipment, keeps work area tidy

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