PLTW COMPUTER SCIENCE

Activity 2.2.1

Careers, Innovations, and Ethics in Computer Science

goals

Develop a computational artifact independently to explore an innovation, career, or ethical considerations of computer science that interest you.

description of task

A computational artifact is something created by a person using a computer. It could be a program, an image, an audio recording, a video, a presentation, or a web page file. Examples include games, interactive stories, infographics, and presentations (images, animations, sounds).

Essential Questions

1. Why is it essential to learn about computer science?
2. What role will computer science play in the career path I choose?
3. Why is computer science more than just programming?
4. What challenges have been created as a result of computer science and how are we as a society trying to address them?

essential Concepts

- Careers, Innovations, and Ethics

Innovations, Ethics, and the Social Dilemma

Computers do not have morals or ethics. They can only do what they are programmed to do, so programmers need to think about the morals and ethics involved in the algorithms they develop.

1. Navigate to the **MIT Moral Machine**.
    - From the top menu, select **About**.
    - Scroll down and view the video, “The Social Dilemma of Driverless Cars”, by Iyad Rahwan.
2. After viewing, navigate back to the **Home** page.
3. View the video clip, “Moral Machine - Human Perspectives on Machine Ethics”.
4. After viewing, select **Start Judging**.

   Before making a choice, think of what rationale you would provide to explain why you made the choice you did as to who would live. While some scenarios may seam silly at first, the implications of what choices the program makes are very serious.

5. Compare your results with your elbow partner. Consider:

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1. How did your choices differ from those of your elbow partner? Which one of you is more “morally justified”?
2. How did you align with other people who have used the Moral Machine? Does the average of all these choices make it the “right choice”?
3. When it comes to the morals and ethics of programming a car, does a correct or wrong response to a situation exist?

Computer science is involved in creating many technologies used in our society. The coding fundamentals you have been learning about, such as conditionals and variables, are used in algorithms to simulate the choices that people make. How can you program something that society does not always agree on?

6. Review and consider some innovations in computer science. Here are some examples of fields you might explore:
    - Medical Technology
        - Medical Apps and websites
        - Surgical Robots
    - Transportation Technology
        - Self-driving Vehicles
        - Flight Instrumentation
    - Graphical 3D Worlds
        - Video Games
        - Movie graphics and animations
        - Special Effects Software

- Criminal Justice Technologies
  - Computational Biology (such as DNA related technologies)
  - Data Analysis Technologies
- Computer Science Theory and Security
  - Cryptography
  - Quantum Computation
- Networking and Connectivity
  - Telecommunications
  - Data Structures
- Artificial Intelligence
  - IBM Watson
  - Computer Identifying Imagery

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7. Review and consider some careers in computer science. Some examples include:
   - Software Developers
   - Computer Hardware Engineers
   - Security Analysts
   - Database Administrators
   - Computer System Analysts
   - Network Administrators
   - Web Developers
   - Computer Programmer
   - Researchers and Computer Scientists

   Many people have the misconception that a career in computer science means simply that you are a programmer. In reality there are many options to choose from that are all considered computer science.

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8. After identifying an innovation and career you are interested in, do some initial research.
   - Use web sources that are reliable and from an authoritative source.
   - Record important information and where you got it from.
   - Collect links to images and videos that are informative.
   - Perform interviews of professionals in the field if possible.
9. Capture information about the career or innovation that you will creatively share with the class:

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1. What is the field you are interested in and why?
2. What kinds of things does a person in the career do?
3. How does the work of a professional in this career impact society?
4. In what ways does a person in this career need to consider moral or ethical situations?
5. How do images, imagery, or the transfer of images impact or influence the career?
6. What kind of learning opportunities are there to be able to get into that field? Such as: college programs, certificate workshop training, or internships.
7. What kind of salaries and personal satisfaction will people in this career experience?

Creating a Computational Artifact

A computational artifact is something created by a person using a computer. It could be a program, an image, an audio, a video, a presentation, or a web page file.

10. Create a computational artifact that provides information about the computer science field or innovation you are interested in.
    - Be sure to address all the research questions.
    - Include images that are informative about what the career includes, what the person does routinely, or work locations.
    - You may choose to use video clips you find in your research to help show the career you choose. The video clip should be short, and not the only source of information you use. You should discuss or highlight key parts of a video.

Conclusion

1. What careers interest you? List three and prioritize them.
2. What innovation that you learned about interests you the most?
3. What misconceptions have you uncovered about computer science?
4. Why are diverse collaborations so critical?
5. Why will cybersecurity considerations always be a critical part of any development process?
6. How did you interpret and respond to the **essential questions**? Capture your thoughts for future conversations.