

Homework 3 – Explore – Impact of Computing Innovations

Due: Wednesday, October 29, 2014

In this homework, you will explore a computing innovation in depth, and create a project report with a visual component (visualization, graphic, movie, ...). This assignment comes directly from the College Board's draft of the AP Computer Science Principles course – high school students taking the college-level AP CS Principles class will do a similar assignment that is submitted as part of their AP test.

The full description, from the College Board document *Computer Science Principles – Performance Assessment*¹, is included on the following two pages, followed by the grading rubric. Your first task will be to select a computing innovation that will be the topic of your report. For some suggestions, there are several published lists of important innovations – here are a few:

- 50 key MIT-related innovations
<http://betaboston.com/news/2014/05/19/50-ways-that-mit-has-transformed-computer-science/>
- 20 biggest tech innovations of my lifetime that I actually use
<http://www.cnet.com/news/20-biggest-tech-innovations-of-my-lifetime-that-i-actually-use/>
- 10 greatest technological inventions
<http://smallbusiness.chron.com/10-greatest-technological-inventions-40511.html>
- Top 30 innovations
<https://compsci.lafayette.edu/homepage/top-30-innovations/>

Some tips: Don't pick an innovation that is too big or broad (like “the computer”), because there's simply too much to be able to write something meaningful and focused. Also, make sure it's a *computer* innovation – some of those lists are broader than just computer or digital technologies.

You are not restricted to these lists or to anything I have mentioned, but if there is any question about whether a topic is appropriate, please ask me. If you go off in a completely weird and inappropriate direction without talking to me first, you run the risk of a low grade.

¹ College Board, 2014, complete document available at <http://apcsprinciples.org/cs-principles-documents/>

Computer Science Principles

Performance Task: Explore — Impact of Computing Innovations

Computing innovations have had considerable impact on the social, economic and cultural areas of our lives. To focus your work on this task, select a computing innovation that has significant impact, or the potential for significant impact on our society, economy, or culture, and that possesses the potential for both beneficial and harmful effects.

You will be provided 8 hours of class time to complete this Performance Task.

A. General Requirements

For this performance task, you are required to:

- work alone while completing the task.
- choose an innovation that has a significant effect on some population. The effect could be a small effect on more than a hundred people, or a very large effect on a smaller number of people.

B. Written Requirements

You will write responses to specific prompts associated with content requirements. Your responses should convey a deep level of understanding about your innovation and its impacts. Your responses must also include information learned from your references.

Innovation

Written responses must include:

- the innovation name and a description of the intended purpose of the innovation. (100 words max)
- an explanation of the technical details of this innovation in terms that someone completely unfamiliar with the innovation would understand. (100 words max)
- a description of the role computing plays in implementing the functionality associated with the innovation. (100 words max)
- a description of the relationship between data and the innovation. For example, you could describe the data used or produced by the innovation or any privacy issues associated with the innovation data. (100 words max)

Impacted Population

Written responses must include:

- a description of the population that is impacted by the innovation, including population characteristics such as approximate size, socioeconomic status, geographic location, health, age, gender, ethnicity, race, sexual orientation, and disability. (100 words max)

Social, Economic, or Cultural Impact

Written responses must include:

- a description of the long-term and short-term impacts (100 words max)
- a description of the beneficial and harmful effects of the innovation (100 words max)

C. Visual Artifact

Choose one of the potential beneficial or harmful effects of the innovation you described in your previous response and use a computer to create a visual artifact related to it.

- The visual artifact must be a visualization, graphic, or movie that provides additional insight to explain, clarify, or depict the beneficial or harmful effect of the innovation you selected.
- Provide a written summary to describe how the visual artifact you created illustrates the benefit or harm of the innovation. (50 words max)

D. References

Include at least two – and no more than five – references/citations to sources used to formulate your responses to this performance task.

- Each source must be a reliable newspaper/magazine article, book, news, or online source that anyone can access.
- For each reference, provide the full citation identifying the author, title, and source. For online references, include the permanent URL and the date on which you accessed the reference.
- At least two of the sources must have been created within the last two years.

E. Submissions

Submit your responses to the prompts described above adhering to the word length restrictions provided with each prompt. Upload your visual artifact using the upload option. If your visual artifact is a video, *its length cannot exceed one minute*. Your teacher will share submission guidelines with you that include suggestions on video tools.

F. Learning Objectives

- 1.1.1 Apply a creative development process when creating computational artifacts. [P2]
- 1.2.1 Create a computational artifact for creative expression. [P2]
- 1.2.2 Create a computational artifact using computing tools and techniques to solve a problem. [P2]
- 1.2.3 Create a new computational artifact by combining or modifying existing artifacts. [P2]
- 1.2.5 Analyze the correctness, usability, functionality, and suitability of computational artifacts. [P4]
- 3.3.1 Analyze how data representation, storage, security, and transmission of data involve computational manipulation of information. [P4]
- 7.1.1 Explain how computing innovations affect communication, interaction, and cognition. [P4]
- 7.3.1 Analyze the beneficial and harmful effects of computing. [P4]
- 7.4.1 Explain the connections between computing and economic, social, and cultural contexts. [P1]

EXPLORE

ASPECT	PERFORMANCE QUALITY			SCORE
<p>Responses to Written Requirements</p>	<p>There is a minimal connection between the response and the references.</p>	<p>There is some supporting connection between the response and the references.</p>	<p>There is a strong, contextualized connection between the response and the references.</p>	
	<p>1</p>	<p>2</p>	<p>3</p>	
	<p>The innovation's name and intended purpose are unclear or incomplete.</p>	<p>The innovation's name and intended purpose are adequately identified.</p>	<p>The innovation's name and intended purpose are described with clear, rich specificity.</p>	
	<p>1</p>	<p>2</p>	<p>3</p>	
	<p>The report offers minimal technical details or explanations of the role computing plays in the innovation. An inexperienced user would find it difficult to understand the innovation.</p>	<p>The report offers sufficient technical details and explanations of the role computing plays in the innovation. An inexperienced user would find the innovation understandable.</p>	<p>The report offers a wealth of technical details, supported by strong explanations of the role computing plays in the innovation. An inexperienced user would find the innovation understandable and significant.</p>	
	<p>1</p>	<p>2</p>	<p>3</p>	
	<p>Data and the innovation are discussed independently in the report.</p>	<p>The report draws a connection between data and the innovation.</p>	<p>The report demonstrates an analysis of data that is clearly and meaningfully connected to the innovation.</p>	
	<p>1</p>	<p>2</p>	<p>3</p>	
	<p>The report identifies a population and minimally or partially identifies effects on that population.</p>	<p>The report identifies a population and generally identifies significant effects on a population.</p>	<p>The report fully identifies a population and precisely describes significant effects on a population.</p>	
	<p>1</p>	<p>2</p>	<p>3</p>	
	<p>The report loosely connects the innovation to its long- and short-term impacts or its beneficial and harmful effects.</p>	<p>The report presents an analysis of the computing innovation and identifies its long- and short-term impacts, and its beneficial and harmful effects, of the innovation.</p>	<p>The report presents a rich analysis of the computing innovation and describes in detail its long- and short-term impacts, and its beneficial and harmful effects, of the innovation.</p>	
	<p>1</p>	<p>2</p>	<p>3</p>	

Visual Artifact (and Written Summary)	The visual artifact provides little insight into the potential beneficial or harmful effects of the innovation.	The visual artifact provides some insight by explaining the potential beneficial or harmful effects of the innovation. The artifact demonstrates creativity.	The visual artifact provides deep insight by depicting and clarifying the potential beneficial or harmful effects of the innovation. The artifact demonstrates a high level of creativity.
	1	2	3
	The summary identifies a potential beneficial or harmful effect of the innovation with no connection to the artifact.	The summary identifies a potential beneficial or harmful effect of the innovation with some connection to the artifact.	The summary, through detailed description, demonstrates a strong connection between the potential beneficial or harmful effect of the innovation and the artifact.
References	There are at least two references, but the references contain many errors, omissions, or are of questionable reliability and timeliness.	There are at least two references, and those references contain required information but all are not reliable, accessible, and/or recent.	There are at least two references, and all references contain required information. All are reliable, easily accessible, and recent.
	1	2	3