

## Seeing Technology's Effects: An inquiry-based activity for students designed to help them understand technology's impacts proactively

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### Overview

Suppose there existed a Science and Technology Administration (STA), which, in the manner of the U.S. Food and Drug Administration (FDA), was charged with assessing the potential impacts of new technologies rather than new foods and drugs.

Then suppose you were an investigator for the STA. What questions would you ask about a technology as you sought to understand its potential impacts so that you could prepare a recommendation about whether or not it should be released into, withheld from, or modified for use by society?

The questions posed by a conscientious STA investigator would fall into five basic categories:

**I. The Technology Itself** – examines the characteristics of the technology in semi-isolation. Using the mechanist's religion of reductionism, the STA investigator asks questions that help us understand the unique characteristics and properties that a technology possesses.

**II. The Social Context of the Technology** – asks questions about technology in relation to family and friends

**III. The Goal of the Technology** – asks questions that explore how technology is imbued with bias and purpose, and is manipulated toward particular ends.

**IV. The Effects of the Technology** – zooms out for a holistic examination of questions concerning technological impacts on the environment, ourselves and our institutions.

**V. Final Recommendation** – synthesizes information gathered then answers the final questions concerning whether the technology is suitable for human use.

**Imagine there existed a Science and Technology Administration (the STA), who, like the FDA, had to screen new technologies before we could buy them. How would they assess innovation?**

## **Activity suggestions for Teachers**

- An STA assessment can be performed on literally any technology, from pencils to computers. Start simply and move into more complicated technologies.
- Conduct a few STA assessments as a whole class. Use the prompting questions to get students to dig into the nature of the technology, to see the implicit ideas and elements of change that a technology embodies.
- Have students use the Internet, perform experiments, conduct interviews – whatever it takes – to understand the nature of the technology at hand.
- For closure, create pairs of teams to debate whether or not a technology should be adopted by society. Pairs of teams, with 2-3 students representing “innovators” and 2-3 representing the STA, works well.

## **STA Questions**

### **Part I. The Technology Itself**

#### **1. What is the technology, who uses it and what does it do?**

Prompting questions include:

1. Who commonly uses the technology? Do you? What for?
1. What is the common experience or understanding of the technology?

#### **2. What is the technology made of and how does it work?**

Prompting questions include:

1. What does the technology or technological structure do, and what is it made of?
2. What subsystems are present, and how do they interact
3. What can we assume about the evolution of the people who created the technology? About their understanding of science? Their mythology? Their manual dexterity?
4. Do we see any implicit social structure in the way the technology is set up? Is there a hierarchy? A lowerarchy?
5. Is their writing anywhere? If so, what does it say, literally and figuratively?
6. Are there pictures anywhere? If so, what are they telling us?
7. Do we see indications of mass manufacturing, individual creativity or both?
8. What energy sources does the technology require, and where do they come from?

### **3. Is the technology more a tool or machine?**

#### **Part A: Overview**

Prompting questions include:

1. How much does the technology make or allow the user to do?
2. Does it exhibit a regular, predictable behavior?
3. Is it locally made?
4. Can the average person fix the technology or does it require a specialist to run and maintain it?
5. How much 'intelligence' does it have?

#### **Part B: Work or Information Machine**

Prompting questions include:

1. Does the technology deal in information rather than work?
2. Can it think? How smart is it?
3. Does it aid and abet automation? Centralization
4. Does it encourage or discourage autonomy and privacy?

#### **Part C: Tool or Technopoly**

Prompting questions include:

1. Does the technology offend, interrupt, or challenge the local mythology or status quo?
2. Is there implicit in the invention of the technology a consideration of ethics, community values, or spiritual beliefs?
3. Is the technology developed within the closed system of efficiency or in a self-fulfilling system of knowledge for knowledge's sake?

### **4. How does it extend people's senses and/or capabilities?**

Prompting questions include:

1. Which of the five external senses does the technology extend?
2. Which of the four interior senses does the technology extend?
3. Using a ballpark estimate, by how much are these senses extended?

### **5. How does the technology alter temporal and spatial relationships?**

Prompting questions include:

1. Does the technology speed things up or slow things down?
2. What experiences do we miss or gain in the process?
3. Does the technology increase or decrease efficiency?

4. Does the technology separate the place of participation from the location of action?
5. Is our involvement passive or interactive?
6. How much of the experience happens in our immediate environment? How much is projected from elsewhere?
7. How much is bit travel versus atom travel? To what extent is bit travel filtered?
8. To what extent does our time-saving technology cost us time, money, and frustration that was not part of our lives before we adopted it?

## **6. What is the technology's range?**

Prompting questions include:

1. What is the domain or extent of the technology's influence?
2. How far or how short a distance can the technology convey information or goods?
3. How temporary or permanent is the technology? Can we get rid of it if we want to?
4. How does the technology meet its demise? Breakage? Trickery? Incompatibility?

## **7. What is the technology's capacity?**

Prompting questions include:

1. How much stuff can the technology carry or accommodate?
2. How much information can the technology convey?

## **8. How dependable is the technology?**

Prompting questions include:

1. When the technology breaks, can we or someone we know fix it?
2. Does the technology contain backup systems that offer protection if it fails?

## **9. What level of involvement does it require? [How hot or cool is it, McLuhanistically speaking?]**

Prompting questions include:

1. How involving is the technology?
2. Does it force us to concentrate on the experience or is background noise?

## **Part II. The Context of Technology**

### **10. Did your parents have this technology at your age? Your grandparents? How did they live without it?**

#### Prompting Questions:

1. Did your parents or grandparents have a different technology or just do without something that met the particular need that the technology meets?
2. How was life different for your parents and grandparents without this technology? Better? Worse? Less distracting but more comfortable?
3. Did the absence of the technology enable more family interaction?
4. Have your parents and grandparents adopted the technology and if so, do they ever talk about the “good old days” when they didn’t have it?

### **11. Do your friends have this technology? Do people you admire have it?**

#### Prompting Questions:

1. Is it a technology that you feel pressured to have because of your social group? Without that pressure, would you want it anyway?

### **12. Does your family consider the technology important?**

#### Prompting Questions:

1. Is the technology a part of your family life?
2. Is it an “assumed” technology – that is, is it just assumed to be part of the average family, including yours?

### **13. Do you and your family talk about it? In what way is it a lifestyle choice?**

#### Prompting Questions:

1. You may have heard the saying, “Technology is anything you didn’t grow up with.” That is, it is unnoticeable. The only way to notice it at times, is to talk about it. Does your family, or do you and your friends, talk about it?
2. Do you consider using the technology a lifestyle choice, and talk about it as something you could or couldn’t do, depending on your own choices in life?

## **Part III. The Biases of Technology**

### **14. What are the inherent biases of the technology?**

Prompting Questions:

3. What behavior does the technology promote or prevent? Discourage or encourage?
4. How does the technology change our capabilities and predispose us to certain actions?
5. What does the technology cause us to do that we weren't doing before we adopted it?
6. What social conditions are necessary to create and sustain a particular technology?
7. What content does the technology favor?

### **15. How is technology interpreted?**

Prompting questions include:

1. How do we interpret the technology?
2. Do other people interpret it as we do, or is our interpretation highly personal?

### **16. Who is selling it? Why?**

Prompting questions include:

1. How does the product's promoter find potential buyers?
2. Which needs does the product's promoter claim to fulfill and which are actually fulfilled?
3. What images does the product's seller project about it and what techniques are used?
4. In what ways does the advertising sacrifice truth to image and presentation?
5. What is the true objective of the images presented?
6. What is the advertiser *not* telling us?

### **17. What is being commodified?**

Prompting questions include:

1. What human desire or weakness is being commodified?
2. What form does the commodification take?

## **18. Is the need for the technology real or created?**

Prompting questions include:

1. Does the technology meet real human needs, or does it create new needs (like roads create the need for cars)?
2. Who defined or tailored the need? How?
3. How well did we function without the technology?

## **Part IV. The Effects of Technology**

### **19. The physical environment?**

Prompting questions include:

1. What are the documented effects associated with the life cycle of this technology, including the effects of using the energy source it requires?
2. What is our intuitive understanding of these effects?
3. Do the documented effects and our intuitive understanding agree or clash?

### **20. The human body?**

Prompting question include:

1. How does the technology improve the lives of humans and the life of the environment?
2. What revenge effects await us?
3. What are the long-term costs of life-extending technologies?

### **21. Social relationships?**

Prompting questions include:

1. Does the technology make us more involved with the people around us or less? How does it do this?
2. Does the technology improve or diminish the quality of our interactions with others? How?
3. Does the technology promote or preclude group activities? Which kinds?
4. Does the technology alter core family relationships?

## **22. Work?**

Prompting questions include:

1. Does the technology weaken or strengthen the power or bargaining position of management? Of workers? Of consumers?
2. How does it impact working conditions?
3. How does it raise or lower people's standard of living?
4. How does it change the nature of the interactions among producer and consumer?

## **23. Your relationship with yourself?**

Prompting questions include:

1. How does or how could this technology change who we are, how we see ourselves, or what you are capable of doing?
2. If the technology gives us more free time, how we spend this time?
3. Does the technology help make us more or less expressive?
4. Does it put us more in touch with ourselves- or less?
5. Does it keep us from experiencing gods and heroes, or has it become our god?

## **24. The power structure?**

Prompting questions include:

1. Who stands to gain most from this technology?
2. What privacies are we losing and what abuses of are we enduring to gain the power the technology offers us?

## **25. Education?**

Prompting questions include:

1. Do people need to be trained or retrained to use the technology?
2. What role should education play in training students to use it?
3. What role should business play in training people to use it?
4. To what extent does the technology facilitate self-training or promote teamwork?
5. How will the technology affect our need to learn quickly, plan broadly, and adapt intelligently to evolving situations?
6. What attitudes should we bring to the technology in order to learn it and use it more effectively?



## **26. On other cultures?**

Prompting questions include:

1. What impact has the technology had on indigenous populations that have adopted it?
2. How would it impact a developing country if it were introduced and used *en masse*?
3. How does it homogenize culture and reduce global diversity?

## **27. Future technologies?**

Prompting questions include:

1. What characteristics predominate in the technology's evolution?
2. Based on the technology's ancestry, what is its most probably future?
3. Does the technology make other technology's inevitable?
4. Can the technology mutate or crossbreed to form new technologies?

## **Part IV. Summary and Reflection**

### **28. How does this technology connect? How does it disconnect? Can it or should it be improved? Is it worth the trade off?**

Prompting questions include:

1. What tradeoff does this technology force us to acknowledge?
2. What do we gain that we did not have before? What do lose that we did have before?
3. How does this technology empower and debilitate us?
4. How does it liberate and enslave us?
5. Can it, should it be improved?