Policy Shift: COVID-19

Grade Level: Secondary
Time: 3-4 hours

OVERVIEW

The 2020 pandemic affected every aspect of our lives. Countries managed it very differently, and understanding how those policies changed the outcomes is essential to handling the next public health crisis. Public policy determined the trajectory of the pandemic, and therefore the long- and short-term outcomes for all of us.

This lesson plan accompanies the **Policy Shift: COVID-19** online interactive tool, which aims to demonstrate a cause and effect between public policy and health outcomes using a statistical model, and to illuminate the complexity of solving this problem when we explore the many factors influencing how public policy is actually decided.

Systems thinking is key to learning engineering, technology and science, as well as understanding social and political phenomena. When we see the world as the interconnection of systems, we better understand how our current realities are a result of these complex and interwoven systems. We then understand that changing reality means changing the system as a whole. A pandemic is a complex problem that requires a systems-thinking approach if solutions are to be effective, and *Policy Shift* guides learners through a process that illuminates a path forward.

The **Methodology** tab of *Policy Shift: COVID-19* explains what and how data was collected to form the basis for this tool. The **References** tab provides background reading for a deeper understanding of how a virus can spread to become a pandemic, as well as the sources informing the tool's **COVID-19 timeline** and **coronavirus history**.

ESSENTIAL QUESTIONS

- What is the novel coronavirus and how does it spread through the population?
- What is a statistical model, and how can it help us to understand, predict and influence the spread of COVID-19?
- How does public policy influence the trajectory of a viral pandemic?
- How can we use systems thinking to understand the complexity of finding solutions to the coronavirus problem?

LEARNING OUTCOMES

- Learners will understand the basics of systems thinking and how it can be used to seek interventions to complex problems.
- Learners will examine how public policy works with statistical models, essentially showing a cause and effect between public policy and health outcomes for a nation or region.
- Learners will demonstrate critical thinking on how policy forms at the intersection of many different considerations.
- Learners consider what questions are critical to deciding if a policy that is not health-specific should be implemented.
- Learners will explore how coronavirus transmission works, what policies impede transmission and when, relative to each other, they can be implemented most effectively.

MATERIALS

- Large paper, whiteboard or online board such as Jamboard
- Colored markers or writing tools
- Access to the *Policy Shift: COVID-19* interactive tool

LEARNING ACTIVITIES

Introduction to the unit:
Prior to beginning this unit, assign learners to write about their experience of the coronavirus pandemic. Choose a writing prompt that will reveal what their personal experiences have been during the pandemic and how it has affected their lives. This insight will help you to be sensitive to learners' emotional needs, knowing that the pandemic has caused significant hardship and loss for many families. It will also establish a baseline of what learners understand about what the coronavirus is, how it has spread and what your community's response has been like. A suggested prompt: How has the pandemic affected your life, either positively or negatively? How have you changed due to the coronavirus?

Present the unit to learners by reflecting as a group on the content of their essays, and then explaining that as a class you will explore the pandemic using an online interactive tool called *Policy Shift: COVID-19*. Prior to engaging with the interactive tool, learners will need these basic understandings:

1. What is systems thinking?
2. What is a virus and how does it spread?
3. What is a statistical model?

LESSON 1

What is systems thinking?

1. DISCUSS: Post this quote from John Muir for learners to consider:
When we try to pick out anything by itself, we find it hitched to everything else in the universe.

In groups of three to four, ask learners to discuss:
- What do you think Muir meant?
- How does this relate to your life as learners?

Provide a large paper and colored markers, or an online Jamboard, and ask learners to:
- Choose one aspect of their student life (i.e., team sports, exams, etc.) and write it in the center of the paper or Jamboard.
- Next, brainstorm how this aspect of their student life is interconnected and interdependent with other aspects of their lives (transportation, grades, etc). What does the exam or the team need to make it happen? What provides that thing? What does that thing need to happen? Record these ideas on the paper and circle them, drawing links between interrelated ideas. Allow this to become ridiculous and fun.

Explain to learners that they may have revealed a system. Next, ask learners to examine their drawings using the following criteria. There are three things that systems must include:
1. Elements: the visible, tangible things that are easily noticed or identified. *Circle these in yellow.*
2. Interconnections: the physical flows and reactions between elements that govern the processes within a system. *Trace arrows in red.*
3. A function or purpose: what the system accomplishes — but not necessarily the same outcome as stated goals or mission. *List the functions (purpose) of this system in green.*

As a whole class, discuss what qualifies as a "system." Experiment with making their systems more expansive and inclusive. Then experiment with what would happen if you changed one piece of that system? (i.e., What would happen if we took away exams altogether?)

Systems-thinking processes help us think about influence, teamwork, leverage points, stakeholders and leadership within an organization, such as a school or a government. They help us identify patterns in organizational behavior and effectively adapt when we encounter complex challenges or external influences.

Following this discussion, explain to learners that by examining the alternative options and choices, we learn more about the choice made and the context surrounding it. These alternative outcomes are called counterfactuals.

2. CREATE: A systems map by brainstorming together factors surrounding the coronavirus:

- Using a red marker, write and circle WHO (people) is affected by the pandemic.
- Using a blue marker, write and circle FINANCIAL effects of the pandemic.
- Using a green marker, write and circle ENVIRONMENTAL effects of the pandemic.
- Using a purple marker, write and circle SOCIAL effects of the pandemic.
- Using a black marker, write as many details about each of these factors as possible.

Save this system map for the final lesson. This can also be made on Jamboard if you are meeting online.

3. EXIT SLIP: Ask learners to list one thing that was discussed today that they already knew, two things that were new ideas for them and three things they are going to remember for the next class.

LESSON 2

What is the coronavirus, and how does it spread?

1. BRAINSTORM: Learners will need a minimal understanding of what a virus is and how it spreads in order to engage with *Policy Shift*. To achieve this, use a **KWL chart** to find out what learners know and what they want to learn about the pandemic. This will also reveal gaps in their knowledge, which can be filled with the following resources:

- Review the **Viral Lifecycle**, which describes an average 21-day cycle of COVID-19.
- Review the **Coronavirus History**, which describes the discovery of the coronavirus and its leap from animals to humans between 1930 and 2019.
- Assign research topics for homework based on the gaps in their knowledge. Share this **PDF from the CDC** or this **short film from BrainPop**. Additional resources can be found on the **Reference** tab of the interactive tool.

2. If your learning goals include a more in-depth look at how viruses spread through a population, try this lesson from **Mathalicious**, in which learners use exponential growth and logarithms to model how a virus spreads through a population and evaluate how various factors influence the speed and scope of an outbreak.

3. The **COVID-19 Timeline** tells the chronological story of how different countries responded to the initial outbreak of the virus from January through July of 2020. It shows how different policies led to different outcomes. Consider asking learners to replicate the timeline in their notebooks in order to become familiar with each country's response. Assign small groups to create and present a poster telling the story of each country's response, experience and outcome. This level of familiarity with the virus' behavior in relation to policy will help them to use the interactive tool in Lesson 4.

4. EXIT SLIP: Ask learners to list one thing that was discussed today that they already knew, two things that were new ideas for them and three things they are going to remember for next class.

LESSON 3

What is a statistical model?

1. DISCUSS: Ask learners to share what they know about statistical models. Show this **StatQuest video** to explain the very basics, and/or the Prezi **Statistical modeling for dummies** to clarify the following information:

Statistical modeling is a simplification of a real-life phenomenon that is used in order to:

a. understand it,
b. predict it, by inserting different information about the inputs into the equation, and
c. optimize it, by modifying input information so that you get the output that you like.

To make a model, we collect data, analyze it and then create the model. Statistical models are used for medical diagnostics, marketing, law enforcement, financial markets and many more situations. They are used for better decision-making. *It is important to point out that models are not reality. They are not intended to be exactly accurate, because they can't be. They are meant to be good proxies for decision-making.

Looking at the systems map that the class created in Lesson 1, discuss what kind of data could be collected to understand and predict the spread of the coronavirus. List the data collection ideas, and ask learners to think about where and how the data might be collected?

A statistical model must be tested and examined from many perspectives if it is to be used with success. How do we know if a statistical model is accurate? The input must be accurate beyond a doubt, and the analysis must be unbiased. We rely on experts for verified information, and on diversity of perspective, or worldviews, to guard against bias.

2. Explain the use of "per capita" to measure the behavior of the virus among the population. Per capita refers to the average number of people affected in relation to the total population. The tool shows the average number of people infected, recovered or who died per 100,000 in the region. You may wish to walk students through an example:

- Go to the **China model**. Click on *Show Per Capita*.
- When the numbers appear in the first row, narrate the graphic aloud for learners, i.e., *In January, an average of 16.6 people out of every 100,000 in the region were infected by the virus. An average of less than 1 person in 100,000 recovered, and an average of less than 1 person in 100,000 died. In February, these numbers changed substantially*. Ask for a volunteer to use the numbers in a sentence, as you modeled above.
- The per capita is used to show change in the average number of people infected, recovered and who died when policies are changed. It is a tool of the statistical model.

LESSON 4

Time to engage with the interactive tool

1. ENGAGE: Learners may enter the online tool once they have a basic understanding of systems thinking, the general behavior of a virus and how a statistical model is used. You should not spend considerable time teaching learners how to use *Policy Shift*, but rather, allow them to explore and teach themselves.

*Every learner is different, and some may need more time than others. Build in extra time for learners who may need it. During this time, learners who are ahead should be encouraged to help others and guide their classmates.

As a teacher-guide, you can support learners as they progress through the interactive tool by asking provocative and speculative questions. These are *most important* for developing necessary critical thinking concerning the pandemic.

- Why do they think a certain country might not have implemented the policy the way they are choosing to, and what factors may have influenced the country's choices? (This is an essential question to support learners to explore: *Connect* to other parts of your curriculum and current events readings, *create* a group discussion to go deeper into this question.)
- Why are they placing policies in particular positions?
- What effect do they think different policies will have?
- What happens when they move the policy around to different positions on the timeline? What else changes?

2. After learners have played through two to three possible country scenarios over 15 minutes of play, divide them into pairs or small groups to discuss their discoveries. Use these prompts:

- What have you discovered about how public policy affects disease outcomes? What can governments do to change disease trajectories? How do they determine what good policy is?
- How did you experiment with public policies? Were you able to tweak public policy to see outcomes in the model? Did you come up with ideas about how certain responses to a pandemic have particular effects and thus should be used in certain ways?
- Record the factors you have discovered through using the interactive tool that will affect the disease trajectories.
- Brainstorm and record other factors (civil rights, public opinion, financial cost) that influence how governments make decisions. In particular, consider the dependencies on the axes used above (social, environmental, financial) and ask why a country might have delayed or not used a policy, or have introduced it sooner.
- Brainstorm additional social and economic costs the model references. What new problems might be created, or how will various members of the community be affected by the policies? *Particularly consider any members of the population that are not typically part of a decision making process. *Particularly consider any cultural or political circumstances (i.e., why contact tracing in China might not be something you actually want to implement, or why it took the U.S. so long to have even the semblance of a coherent mask policy and the public opinion against it).

LESSON 5

A systems map to demonstrate learning

1. Introduce the activity by reminding learners that the pandemic is complex and has many factors or elements involved. Before developing any sort of solutions, we need to understand how the pandemic functions as a system. We may not know all the parts of the system, but we definitely have a perspective or worldview based on our knowledge, experience and understanding of the issue.

2. The activity will move learners through a series of systems-thinking steps, helping them visualize their personal worldviews within a larger system. You may choose to focus on the first two steps of the process, which will generate a systems map. The weighting steps allow learners the opportunity to consider the influence of elements within that system.

a. Identifying the elements.
b. Identifying the interdependencies between the elements.
c. Weighting the elements.
d. Weighting the interdependencies.
e. Brainstorming systemic interventions.

3. Review two key terms with learners:

- *Elements*: These are the discrete parts or factors of a system. In other words, they are the persons, places and things that make up the system at large. In a system that is looking at a social problem, the elements might include different types of organizations, public and private institutions, products, currencies, technologies, policies and of course people. To help learners understand elements within a system, provide the example of a physical system, such as a food web or a body system (e.g., digestive, circulatory, etc.) and discuss the various elements in each.
- *Interdependencies*: These are the relationships that connect the elements. In systems thinking, these interdependencies help tell the story of what is happening inside the system and how the system can adapt to changes. In social systems, interdependencies might reflect funding patterns, supply and distribution chains, service relationships, education, advocacy and many other types of interconnections.

4. Provide each learner with sticky notes or index cards, a sharpie or marker, and large sheets of paper to construct their map. (This can be done on Jamboard as well.)

5. Identifying the elements:

- Tell learners: When you think about this complex problem, what are the factors or elements that are associated with this issue? These can be people, places, ideas, things, policies, etc.
- Encourage learners to generate at least 20 elements of the system. Remind learners that this brainstorm should produce elements only, not any solutions. The exercise does not need to produce an exhaustive list of every possible element. What will become important in the next step is identifying the interdependencies between the elements to understand how the system is structured.
- Have learners arrange their index cards or sticky notes on a large sheet of paper with enough space between them to eventually draw connecting lines.
- It is helpful to have elements that are closely related to one another to be clustered near each other.
- Once the index cards or sticky notes are arranged on the sheet of paper, keep them in place for the rest of the activity.

6. Identifying the interdependencies between the elements:

- Tell learners: Now that you have identified the elements associated with this complex challenge, what are the relationships between them? None of these elements exist in isolation, they function in relation to each other.
- Using a marker or pen, have learners draw lines connecting the elements. It is helpful to talk through this process to ensure that elements are being connected to all the other elements they are related to. For example, there might be a line connecting social media to mask-wearing compliance.
- Ensure that all elements have lines connecting them to other elements.

7. Weighting the elements:

- Ask learners to consider that not every element has the same power or influence on the system as others.
- To model this power differential, ask learners to rank or weight each element with a 1, 3 or 5, with 1 representing the least influence on the system, 3 as intermediate, and 5 with the greatest influence on the system.
- To ensure that learners do not weight all of the elements as a 5, ask them to limit the number of 5s. For example, facilitators might ask learners to only have three to four elements ranked as a 5.
- Learners should indicate the weighting on the index card or sticky note.

8. Weighting the interdependencies:

- Tell learners that in addition to the elements, there are some interdependencies in the system that are more influential than others.
- Ask learners to rank the interdependencies (i.e., the connecting lines they drew between the elements) with the 1-3-5 system, with 5 being the most influential.
- Learners should restrict the number of 5s. In other words, not all interdependencies are the same level of influence in the system.
- Brainstorming Systemic Interventions:
- Now that learners have generated a systems map of the complex challenge according to their worldview, they can begin to brainstorm interventions or possible solutions that are systemic.
- Ask learners: If you had restricted resources and capacity, and could only act on one or two areas of the system to create a shift or change in this system, what elements and interdependencies would you focus on?

9. Have learners share their maps and systemic interventions through a gallery walk or presentations with their peers.

10. Use the following questions to debrief after the systems-mapping exercise. These can also be used as a final reflection for assessment purposes.

- In relation to the systems maps constructed by others, what did this activity reveal about your own perceptions and values of the complex problem?
- Are there elements and/or interdependencies that you had not considered, but are present on others' maps? How does that help you see your map as only part of a larger system?
- How do you think your own life experiences influenced your map making?
- How did the process help visualize your understanding of a complex global challenge?
- How does systems-mapping challenge a traditional linear approach to cause-and-effect problem-solving?
- What was challenging about this activity? What was eye-opening?
- How did the systems mapping allow us to develop possible systemic interventions?
- How would systems thinking help us make better decisions in life and work? How might it help us have better conversations with those who disagree with our perspective?