

The Nature of Science and Reactions to New Disease

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How often does the news report a new illness that sends the general public into panic? Swine flu, Zika and Ebola are big name illnesses that get a lot of attention and action despite the overall low percentage of deaths associated with each. The latest flu-like virus, the Coronavirus, is a perfect example. Vacationers have been quarantined and many are scared of contracting this virus. As educators, we can use the NGSS Nature of Science standards to guide our students through the history and philosophy of science and why humans react as they do to these illnesses. This will both ease their fears and help them become more informed.

I began thinking about this after hearing a recent NPR report on how viruses are named. The segment was produced in response to the World Health Organizations request that new diseases be named more carefully. “A poorly named pathogen can have unexpected consequences. Back in 2009, the H1N1 flu was also known as the swine flu. The pork industry hated the name, and officials in Egypt ordered every pig to be killed, even though the virus is not spread by pigs. And with MERS, it has the words Middle East right there in the name.” (Dahlberg, 2020) While this same piece states that SARS was properly named to diminish confusion, I once played on an ultimate frisbee team sponsored by SARS Maine or Sexual Assault Response Services of Maine. I still have my team shirt that proudly says “SARS of Maine” across the back and generates looks of confusion and questions when I wear it. The

Maine organization has since changed its name to SARSSM (adding in Southern Maine) which doesn't have the same roll off the tongue that SARS had.

In a recent article published in the Berkeley News in California, reporter Kara Manke interviewed infectious disease specialist John Swartzberg about the Coronavirus and the panic surrounding this new disease. Swartzberg points out that education and communication is key to eliminating unnecessary panic. He explains that because influenza has been around a long time, we are not as scared of it despite the higher percentage of deaths associated with it. "New things that are not well understood are far more frightening than old things that are well understood." (Manke, 2020) Swartzberg goes on to explain that media coverage has been mostly informative and less sensationalized in the United States than it was with the SARS virus. While the Coronavirus has made its way into the United States, it can be contained and even prevented with the right precautions. Masks that fit correctly, washing hands, and avoiding ill people are the same precautions we take to avoid influenza.

Is it human nature to react to what we do not understand or until we are proven wrong? In the age of social media and the instant gratification of looking something up online, are we too quick to think the worst without questioning the validity of the source? Scientific American reporter, John Horgan, had the opportunity to interview Karl Popper in 1992 and published an updated version in a 2018 blog post. Known best for his falsification principle-that science can only disprove a theory, Popper claimed we can never really know that a theory is true. "We must distinguish between truth, which is objective and absolute, and certainty, which is subjective." (Horgan, 2018)

The scientific method, as taught in many classrooms, is linear, starting with a question and research and ending with a conclusion that speaks to that question or hypothesis. In my classroom, however, I teach the scientific method as a circle, with no straight path and no concrete direction in which to travel. Scientists often ask a question, develop a hypothesis and design a way to test that hypothesis. Often the test fails, or needs tweaking, and the scientist must go back and do more research before testing again. While Popper might argue this in support of his falsification theory, I lean more towards the philosophy of Imre Lakatos who believed “in science, a ‘theory’ is really a succession of slightly different theories and experimental techniques developed over time...instead of theories being summarily rejected at the first conflict with observation, science is now seen to proceed by continually adjusting and developing the protective belt around the hard core of a research program.” (O’Rafferty, 2011)

NGSS offers us Nature of Science Standards. NGSS recognizes that “science is both a set of practices and the historical accumulation of knowledge.” (NGSS, 2020) As we explore these standards students can think critically about the information at hand, keeping the human aspect of science in the forefront of their analysis. In response to the Coronavirus panic, I would have students find information about the disease and dissect it with a focus on these standards:

- Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.
- Scientific knowledge is based on the assumption that natural laws operate today as they did in the past and they will continue to do so in the future.

- Science distinguishes itself from other ways of knowing through use of empirical standards, logical arguments, and skeptical review.

In 1918 the Spanish Flu Pandemic infected one-third of the world population, killing 10% of those infected. “Advances over the past century have clearly improved global preparedness to respond to an influenza pandemic. We now have advanced capabilities in prevention, surveillance, diagnostics, and treatments that were unknown 100 years ago, as well as a myriad of tools for pandemic response planners.” (Jester et.al., 2018) Understanding the Nature of Science standards while investigating new disease and human reaction is something we can all do in our classrooms. Taking a quick time out from our curriculum as these events take place is imperative and relevant to the transfer of skills that NGSS asks for. Advancements in science and a critical view of history will help our students ask objective questions, seek results that are repeatable, and think with logic, not sensationalism.

References

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