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Presence of Nature of Science & Math in Media Coverage

The Nature of Science and Math is present in everyday communication going unnoticed by untrained eyes. Media coverage, social media, and daily communication have the presence of these natures without the awareness of those around them. On September 16, 2018 an article addressing one of the many health issues in Rwanda was published in the ***New York Times***. Author Denise Grady experienced, wrote, and published the article ***"Where a sore throat becomes a death sentence"***. The article addresses how children who contract a strep throat infection and due to poverty do not receive treatment develop a much more horrific condition, heart disease. As I read through the article, I was able to make observations of the presence of the tenets of Nature of Science and Math.

Scientific Knowledge is Based on Empirical Evidence

Empirical evidence is based on observation or experience. In the article the author states that the patients had a swollen belly due to liquid retention. Their community would shame these young female patients for having a "pregnant" belly, while the ultrasound technicians would test the patients only to find their enlarged bellies were due to enlarged livers, spleens, and fluid retention. The article goes into detail as to how the patients are evaluated and details how their hearts must be observed and measured. The technicians observe the heart to see if the valves are functioning properly, measure the pressure gradients of the valves, and measure the blood flow through the heart. This empirical evidence is used to gain an intensive scientific knowledge of how the patients' hearts are functioning.

Science is a Way of Knowing

We cannot make decisions without knowing what we are striving for or what the outcomes may be. The Science of Knowing is applied in everyday actions and activities. Many times, we are unaware that we are applying it. Throughout the article the author mentions how the patients are cared for by a humanitarian medical group that makes a trip to Rwanda once a year and can only treat a very limited number of patients. The team of techs, nurses, and surgeons must evaluate, test, and observe the patients to make decisions and *know* which patients will be able to undergo a life saving surgery. The Nature of Science is observed here in the use of their empirical evidence they gather to get to know what patients will be treated with surgery and which will receive medical therapy.

Science is a Human Endeavour

As humans we seek to improve the world around us by understanding it and explaining using empirical evidence gathered. The surgical team in the article began its journey when one of the leading doctors volunteered in Rwanda and saw the medical conditions and needs of its residents. Through her endeavor, a team was formed and now every year they head out to help. Her observation of the world around her and the conditions was what pushed her to try and begin making a difference in the lives of the Rwanda residents. Not only is she making observations and wanting to better the science used to treat these patients, but now the whole team is in the journey with her. All team members make great sacrifices to travel and offer their help. They gain knowledge with every trip and use science to teach and train resident doctors with a final goal in mind: to provide Rwanda with its own permanent cardiac surgical team and hospital.

This is a great example of how Science is a human endeavor with a beneficial and humanitarian goal.

Make sense of problems and persevere in solving them

Throughout the natural world, math is present in our observations. To make sense of the world around us, we must make sense of the problems and try to solve them. The biggest problem that the surgical team faces in Rwanda is evaluating the patients to determine if they are eligible for surgery. They look at the evidence and data that they collect to solve the problem and construct their list of eligible patients. This leads us to the next tenet of constructing variable arguments and critiquing the reasoning of others.

Construct variable arguments and critique the reasoning of others

Using their data and evidence, the team gathers to make a final decision on the quantity and identity of the patients that will undergo surgery. In this meeting, they critique each other's decisions on their choice of patients and must form valid arguments as to why they were chosen. In one instance, the case of a 14-year-old is presented. The surgical doctor's critiques the reasoning and concludes that the patient is too ill and high risk to under go surgery. At the request and well-presented argument of the patient's cardiologist and nurse practitioner, the team decides to give the patient another evaluation, in which the final decision places the patient on medical therapy but not on the surgical table.

Use appropriate tools strategically

The doctors, surgeons, technicians, and nurse practitioners use the data and information collected to form the decisions on what steps they must take with each patient. They use the scans of the heart, any bloodwork collected, and patient history to solve the problems at hand. Is this patient eligible for surgery? Can they afford to wait one more year before they need the surgery? Are they too ill to undergo surgery? Is medical therapy the only option available for this patient? Year after year the team must use every tool available to them to strategically place each patient in the appropriate treatment. It is not an easy job, but it is carefully and successfully accomplished as they use math and science to come to a solution.

As we navigate through our daily routines, we must be aware of the nature of science and math. We use it knowingly or unknowingly. We read it and hear it yet are unaware of how it is being used by our brains to allow us to form our own conclusions and solutions to the issues and problems that surround us. The Nature of science and math is all around us; as teachers, we must use it and equip our students to identify it.

References

Bradford, Alina (7/27/2017)
https://www.livescience.com/21456-empirical-evidence-a-definition.html

Grady, Denise (9/16/2018) *The New York Times* Where a sore throat becomes a death sentence
https://www.nytimes.com/2018/09/16/health/rwanda-strep-heart-disease.html?action=click&module=Top%20Stories&pgtype=Homepage

https://www.johnnosscience.com/science-as-a-human-endeavour.html