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It is difficult to characterize the relationships between technology, science, and culture.

So we asked, what can technology and science applied by engineers and medical technologists do to improve general understanding of science and to the needs of society?

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Culture, Science, Medicine, and Technology

From the Tuskegee Experiment pictured above to Covid – 19 in the Wuhan Lab the balance between science ethics has created distrust and death. We anticipate discussions on how scientists' values and beliefs are influenced by the larger culture and in turn, influence the questions they choose to pursue, and how needs of communities are emphasized in diagnoses and treatment.

In many instances, science is interpreted and used as the basis for policies and regulations involving medicine and treatment . Understanding and valuing culture in this process is a necessity.

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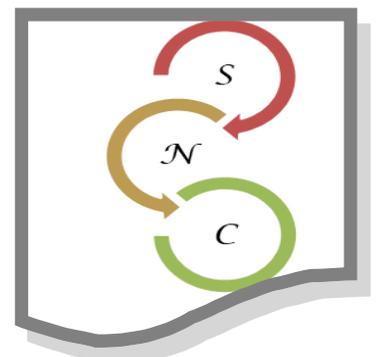
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In this issue

Science and Culture are intertwined

Embracing culture and science in Teaching



One reason we selected this topic to explore

The five million American Indians and Alaskan Natives living in the US make up 1.2 percent of the country's population. This incredibly significant portion of the US population are sorely under-represented in Science, Technology, Engineering and Mathematics (STEM) subjects in academia. In chemistry, American Indians are awarded 0.8 percent of bachelor's degrees and only 0.6 percent of PhDs. Things only get worse as you look higher up in academia. The American Indians tenured in the top 100 chemistry departments in the US number appears to be under ten persons.

Presently, there are 32 fully accredited Tribal Colleges and Universities (TCUs) in the United States. Located mainly in the Midwest and Southwest, TCUs service approximately 30,000 full- and part-time students.

The Role of the Scientist

How scientists' values and beliefs are influenced by the larger culture and in turn, influence the questions they choose to pursue, and how needs of communities are emphasized in diagnoses and treatment. The subjective values, perceptions on social structures, personal intra-cultural experience may all result in the authority of science being mis-directed. History proves this.



On the other hand, culture (languages, customs, beliefs) may affect the science. If society is motivated to obtain certain types of science-based medical or technological applications, this can influence the types of scientific research that is supported with its resources. Impact and outcomes can be preferred or un-intended.



As we know, our society—hence, our classrooms—are becoming increasingly diverse in terms of racial, ethnic, cultural, economic, and religious diversity. Much of this diversity brings challenges in meeting the needs of all our students. In the current situation of the COVID-19 pandemic, educational, health, and racial disparities are magnified and brought into the light more than ever. As we think about what to teach during a global pandemic, questions regarding the curriculum and instruction also come into greater focus. What kinds of approaches are used to raise critical consciousness and cultural connections in the content that we teach to our students? Several approaches have been used that focus on student diversity

Mensah, F.M. 2011. A case for culturally relevant teaching in science education and lessons learned for teacher education. The Journal of Negro Education 80 (3): 296–309. Also, <https://www.nsta.org/science-and-children/science-and-children-marchapril-2021/culturally-relevant-and-culturally>

A Primer on the Topic

Some definition is needed. Science is part of culture, and how ... science is done largely depends on the culture in which it is practiced. However, most modern studies of the world around us are empirical, and there is clearly much more to understand than what is being studied by scientists.

SCIENCE AFFECTS CULTURE.

The most obvious effect of science has been its medical and technological applications, with the accompanying effects on health care, lifestyles, and social structures. But science also influences culture, in many modern societies, by playing a major role in shaping cultural worldviews, concepts,



and thinking patterns. Sometimes this occurs by the gradual, un-orchestrated diffusion of ideas from science into the culture. At other times, however, there is a conscious effort, by scientists or nonscientists, to use "the authority of science" for rhetorical purposes, to claim that scientific theories and evidence support a particular belief system or political program. Critical Race Theory is studied exclusively in higher education, nonetheless local politically driven culture has confused it with local teaching of history and civics.

CULTURE AFFECTS SCIENCE.

Some influence occurs as a result of manipulating the "science affects culture" influence described above. If society wants to obtain certain types of science-based medical or technological applications, this will influence the types of scientific research that society supports with its resources. And if scientists (or their financial supporters) have already accepted some cultural concepts, such as metaphysical and/or ideological theories, they will tend to prefer (and support) scientific theories that agree with these cultural-personal theories.

For example, the Soviet government supported the science of Lysenko because his theories and research supported the principles of Marxism. This raises several questions.

How does technology affect culture?

What are the benefits of technology in our daily lives?

How does technology help students to learn?

What is technology in terms of education?

How does culture influence science and technology?

Is technology the answer to poverty?

Medicine Across Cultures

Many people consider the Western medical approach to be an absolute, which is not the case once one has a cross-cultural perspective. In the Western model, if there is disease, then it or at least its symptoms should be removed; this seems to be obvious. However, there are many other approaches around the world, ranging from slight differences between the American and European outlook to entire different medical systems. An understanding of these differences might well lead people to take a different or more comprehensive approach to their own health, to their benefit.

“It’s a reality the Covid 19 pandemic has brought into stark relief: Lack of cultural competence and systemic racism is endemic in U.S. health care. COVID-19 has disproportionately hit communities of color — a June 2020 analysis by health professions found that in one region of Louisiana, 3 in 4 patients hospitalized for the virus were Black, even though only 1 in 3 residents of that region were Black. Infection and death rates have also been two to four times as high among Black, Latino and Asian peoples as among white people, according to an analysis of 300 hospitals in 21 states.”

The excerpt above is from an article appeared in the July/August 2021 issue of Discover magazine as "COVID Lessons."

Cross-cultural views of medicine show differences in outlook

Different cultures, even when they are as similar as American and European, have vastly different outlooks on medicine and on what is emphasized. For example, compared with Americans, the French are healthier overall, they focus on the health of the liver more, and they are more casual about dirt and germs. In Britain, physicians receive the same salary regardless of how much or how little treatment is given, with less treatment given in most cases than by American doctors who are generally paid by the treatment.

The British focus more on quality of life and less on simple longevity.

In Germany new drugs must only be shown to be harmless, not necessarily effective, to be approved, giving the consumer more choices. The German equivalent of the FDA is generally much more liberal in accepting therapies considered alternative in the US, in large part because pharmaceutical and insurance companies exert less control overseas than here.

Chinese Medicine, alternative here, is conventional in China, and is used there in conjunction with Western-style medicine. What is considered alternative in one country may be conventional and widely accepted in another.



- Variation in vaccination rates across affluent, poor, and racial groups in the US
- Variation in vaccination rates between countries across Eastern and Western Europe and between nations in the Middle East and Pacific Rim

Culturally Responsive Teaching Strategies for the Science Classroom

Science starts with a journey of discovery. Connecting culturally diverse students to a body of knowledge that can promote safe interactions with the natural environment, good health, and a chemical and biological understanding of the world around them will enhance their life outcomes. Students from diverse backgrounds, particularly Black students along with other racial minorities, are underrepresented and poorly served within the scientific community. As teachers, we can break this cycle by promoting and incorporating culturally inclusive methods as we present science content.

Many Native American students have problems in traditional American schools, and the dropout rate of Native American students indicates this (Lomawaima, 1995; Rhodes, 1988). Researchers often point out that one reason students may encounter difficulties in school has to do with a school district's neglect for the learning style or culture of a given group (Pewewardy, 2008; Rhodes, 1988; Swisher, 1991).

The label Hispanic is used as an umbrella term that encompasses primarily Mexican Americans, Puerto Ricans, Cubans, and Central and South Americans. So the term Latino cannot be used to accurately embrace all of these cultures because they are each distinct and different. Moving from an urban environment to less populated areas of origin places additional responsibility on educators to value the "proper" culture in lesson plans and in instructional methods.



How culture, science, and concern for DEI is addressed in the article; ***The Need for Cultural Competence in Science: A Practical Approach to Enhancing Equality, Diversity, and Inclusion***

<https://onlinelibrary.wiley.com/doi/10.1002/anie.201900057>

Culture affects Health Beliefs and Treatment Choices

All cultures have systems of health beliefs to explain what causes illness, how it can be cured or treated, and who should be involved in the process. The extent to which patients perceive patient education as having cultural relevance for them can have a profound effect on their reception to information provided and their willingness to use it. Western industrialized societies such as the United States, which see disease as a result of natural scientific phenomena, advocate medical treatments that combat microorganisms or use sophisticated technology to diagnose and treat disease. Other societies believe that illness is the result of supernatural phenomena and promote prayer or other spiritual interventions that counter the presumed disfavor of powerful forces. Cultural issues play a major role in patient compliance and treatment selection.