

Efforts to make science relevant to diverse populations inadvertently create divisions, study finds

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Around the turn of the 20th century, U.S. educators widely considered certain populations less educated, less healthy and unprepared to be true American citizens. If asked, most might argue those practices have

disappeared as social norms have changed—particularly given that many reforms today focus on equity and diversity. A University of Kansas researcher has published a study showing how the very efforts to make science relevant to diverse populations inadvertently create new divisions by relying on educational practices with unexamined colonial histories.

When science education crystalized as a school subject in the early 1900s, the United States was experiencing great changes. Large groups of immigrants were arriving from southern and eastern Europe, African-Americans were migrating in large numbers from the rural South to urban North, and the United States was undertaking colonial efforts in Puerto Rico and the Philippines. Schools were segregated by law, and science education became one area where experts sought to "make" healthy Americans by designating some students in need of compensatory curriculum, according to Kathryn Kirchgasser, KU lecturer in curriculum & teaching. Published in the journal *Curriculum Inquiry*, Kirchgasser's study outlines how, in early 20th century science education, certain immigrant groups and colonized peoples were racialized as unfit "noncitizens" who required science-as-public-health. Despite important shifts, current educational practices fall into the same trap—relying upon similar techniques to differentiate science education based on perceived differing health needs. This risks perpetuating societal problems by explaining them at the level of individual psychology and exacerbating disparities in tracked science courses.

The Next Generation Science Standards, or NGSS, are being implemented in U.S. schools with the goal of improving science relevant to the lives of diverse student populations. This aligns with broader reforms to link science education to real-world problems such as the obesity epidemic by having students from marginalized groups analyze data on their daily habits and advocate for healthier choices in their homes and communities. The standards recommend that teachers connect science to students' everyday lives through methods like

discussing the dangers of high-fructose corn syrup in order to motivate students from nondominant racial and ethnic groups. While the goal of improving science education for all students is admirable, Kirchgasler said, the reforms reflect a tendency to formulate educational and health disparities in psychological terms by assuming some children and families lack the knowledge or motivation to make informed, responsible choices. Societal explanations such as unequal access to health care, income inequality, food deserts and others tend to be overlooked.

In her research, Kirchgasler has previously studied how students are selected for the type of science instruction they receive. In a study of a high school confronting racial and socioeconomic disparities in tracked science courses, she found that students in higher-level classes were often positioned as future experts, such as taking part in exercises where they play the part of emergency room surgeons. Meanwhile, lower-level courses, which disproportionately served low-income students and students of color, prioritized helping students become science-literate citizens, such as writing letters convincing family members to make healthier choices.

"It really demanded looking at history and how we got here. Perceptions of distinct health needs kept coming up as a way we separate students," Kirchgasler said. "That discrepancy between who is viewed as a future scientist and those who are viewed as not having scientific knowledge, seemed to mark some bodies—particularly along socioeconomic and racial lines—as already not measuring up. That seemed to me like a paradox."

In her current study, Kirchgasler details a teaching practice common in U.S. urban schools serving immigrant groups and in U.S. colonial schools in the Philippines in the early 1900s. Students were regularly given questionnaires to fill out about their home lives detailing

conditions of cleanliness, whether they slept with windows open, brushed teeth regularly, had "vicious personal habits," "defective speech" and a number of other factors. The survey made these students' private homes into a lab. This type of data was used to justify both the segregation of students within U.S. schools and policies arguing that Filipino residents were not hygienic or knowledgeable enough to be American citizens and therefore were not ready for self-governance. In current reforms, similar practices of assessing local needs and enlisting students to promote healthy habits persist; however, today they're offered as ways of recognizing diversity and empowering youth.

"We tend to think of diversity as a new initiative, but in fact, adapting education for what were labeled as different populations has been a continual project, and these early dividing practices translate to a key reason we have different levels of science education today," Kirchgasser said.

One example is a focus on diabetes and obesity in science classrooms today. While those are worthwhile topics, curricular reforms target Hispanic, African-American and American Indian students in attempts to apply science to a problem assumed to carry personal relevance. Students are often assigned to keep a food diary of the meals or snacks eaten at home and to come up with projects to share nutritional advice with their family or community. While not as direct as hygiene surveys in the colonial Philippines, today's [educational practices](#) often still attribute health problems to individual choices and divide those deemed ready for a chemistry or anatomy lab from those who need to apply the lab to their home life instead.

"Ironically, reforms intended to make science relevant to students of color are often housed in lower tracks that restrict access to college preparatory coursework," Kirchgasser said. "At the same time, the presumed distinction between relevance and rigor also does a disservice

to those in the higher track, who tend to receive more decontextualized science instruction. Neither track really gives students a chance to examine the scientific and sociopolitical complexities of issues like health disparities, food justice or climate change."

There is an assumption both in society and education that we as a nation are continually progressing and that there is no need to look at the past. However, with hindsight, it's clear that health is not a neutral category, Kirchgasser said. In the Philippines, what got noticed as a health need was anything unfamiliar or different from U.S. colonial officials, like labeling pomegranates as inferior fruit or breast-feeding as excessive.

"Looking back reveals how the notion of healthy citizens easily slips into the projection of cultural norms and preferences as universal signs of mental maturity or prerequisites for full citizenship," she said.

In future research, Kirchgasser intends to study health-oriented [science education](#) reforms being put in place across U.S. schools, as well as studying specific reforms aimed at Latinx students, and what tensions arise when [science](#) teachers and public health professionals come together to redress inequalities in health care, education and environmental justice.

In the meantime, Kirchgasser said, teacher education should consider its past in order to help ensure that future educators think about educational and [health disparities](#) not as individual gaps to remediate but as sociopolitical phenomena. This reframing may help discourage racial and socioeconomic essentialisms in the name of diversity and entail a different ethical responsibility toward collective action.

Provided by University of Kansas

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