1-2022

Inclusiveness in Teaching : Aligning Culturally Relevant Journal Articles With Course Content

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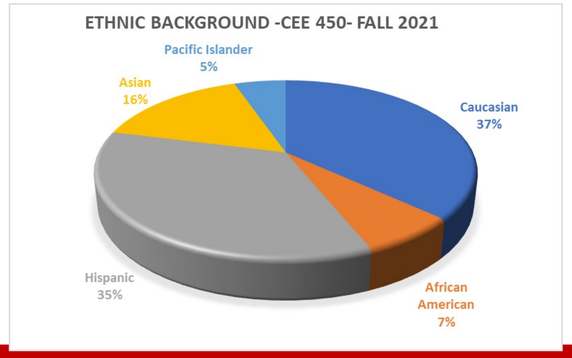
Teaching Practice & Need it Addresses

The practice focuses on Inclusiveness in Water/wastewater Engineering Teaching. Upon reviewing the ethnic (Fig. below) and gender diversity (24% women) of her 57- student course on water/wastewater treatment, the Instructor replaced previously assigned articles with the reading of articles focusing on water issues affecting minoritized communities in the U.S (see references). The goal was to make students aware of water/wastewater issues facing minority communities in the US. Often, the media portrays Africa or South America as places where safe water is not available, ignoring the needs of minoritized communities in the US. A second goal was to evaluate the interest of students in this issue and determine if students of different ethnic background respond differently to questions posed about water/wastewater issues in these communities.



Reference of Articles Used

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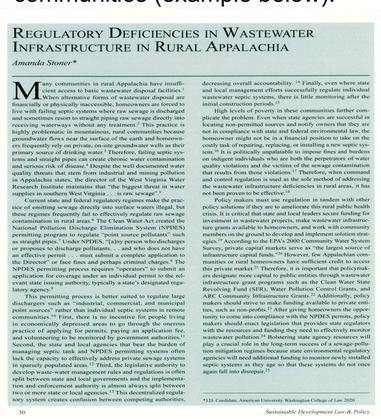
How Others Can Adopt This Practice

- The first step is to find relevant journal articles that align with the content of the course. It is not hard to align the issues of minoritized communities with coursework content. There exist social, economic, environmental, infrastructure issues, etc. that impact many minority student and their communities. Given the diversity of students in our classroom and without changing the content much, any faculty member can introduce relevant topics.
- . It is important to present the readings and let student reflect on them, without trying to advocate as a faculty member. The goal is awareness that may shape how students will use their degree in the future.
- Once the articles are selected, the instructor can add, to planned homework assignments, reflection questions about the article. It may be necessary to adjust the time commitment of the planned homework to accommodate the extra reflection questions.

Resources & Where to Find Them

- Google scholar and Scopus were use to find articles that relate to the class topic but yet address water/wastewater issues in indigenous, economically disadvantaged, and black and brown communities (example below):



REGULATORY DEFICIENCIES IN WASTEWATER INFRASTRUCTURE IN RURAL APPALACHIA

*Amanda Stoner**

Many communities in rural Appalachia have insufficient access to basic wastewater disposal facilities.[1] When alternative forms of wastewater disposal are financially or physically inaccessible, homeowners are forced to live with failing septic systems where raw sewage is discharged and sometimes resort to straight piping raw sewage directly into receiving waterways without any treatment.[2] This practice is highly problematic in mountainous, rural communities because groundwater flows near the surface of the earth and homowners frequently rely on private, on-site groundwater wells as their primary source of drinking water.[3] Therefore, failing septic systems and straight pipes can create chronic water contamination and serious risk of disease.[4] Despite the well documented water quality threats that stem from industrial and mining pollution in Appalachia states, the director of the West Virginia Water Research Institute maintains that "the biggest threat in water supplies in southern West Virginia . . . is raw sewage".[5]

Current state and federal regulatory regimes make the practice of emitting sewage directly into surface waters illegal, but these regimes frequently fail to effectively regulate raw sewage contamination in rural areas.[6] The Clean Water Act created the National Pollution Discharge Elimination System (NPDES) permitting program to regulate "point source pollutants" such as straight pipes.[7] Under NPDES, "[a]ny person who discharges or proposes to discharge pollutants. . . and who does not have an effective permit . . . must submit a complete application to the Director" or face fines and perhaps criminal charges.[8] The NPDES permitting process requires "operators" to submit an application for coverage under an individual permit to the relevant state licensing authority, typically a state's designated regulatory agency.[9]

The permitting process is better suited to regulate large dischargers such as "industrial, commercial, and municipal point sources" rather than individual septic systems in remote communities.[10] First, there is no incentive for people living in economically depressed areas to go through the onerous practice of applying for permits, paying an application fee, and volunteering to be monitored by government authorities.[11] Second, the state and local agencies that bear the burden of managing septic tank and NPDES permitting systems often lack the capacity to effectively address private sewage systems in sparsely populated areas.[12] Third, the legislative authority to develop waste-water management rules and regulations is often split between state and local governments and the implementation and enforcement authority is almost always split between two or more state or local agencies.[13] This decentralized regulatory system creates confusion between competing authorities, decreasing overall accountability.[14] Finally, even where state and local management efforts successfully regulate individual waste-water septic systems, there is little monitoring after the initial construction periods.[15]

High levels of poverty in these communities further complicate the problem. Even when state agencies are successful in locating non-permitted sources and notify owners that they are not in compliance with state and federal environmental law, the homeowner might not be in a financial position to take on the costly task of repairing, replacing, or installing a new septic system.[16] It is politically unpalatable to impose fines and burdens on indigent individuals who are both the perpetrators of water quality violations and the victims of the sewage contamination that results from those violations.[17] Therefore, when command and control regulation is used as the sole method of addressing the wastewater infrastructure deficiencies in rural areas, it has not been proven to be effective.[18]

Policy makers must use regulation in tandem with other policy solutions if they are to ameliorate this rural public health crisis. It is critical that state and local leaders secure funding for investment in wastewater projects, make wastewater infrastructure grants available to homeowners, and work with community members on the ground to develop and implement solution strategies.[19] According to the EPA's 2000 Community Water System Survey, private capital markets serve as "the largest source of infrastructure capital funds."[20] Many rural Appalachian communities or rural homeowners have sufficient credit to access this private capital.[21] However, it is important that policymakers designate more capital to public entities through wastewater infrastructure grant programs such as the Clean Water State Revolving Fund (SFR), Water Pollution Control Grants, and ARC Community Infrastructure Grants.[22] Additionally, policy makers should strive to make funding available to private entities, such as non-profits.[23] After giving homeowners the opportunity to come into compliance with the NPDES permits, policy makers should enact legislation that provides state regulators with the resources and funding they need to effectively monitor wastewater pollution.[24] Bolstering state agency resources will play a crucial role in the long-term success of a sewage-pollution mitigation regimes because state environmental regulatory agencies will need additional funding to monitor newly installed septic systems as they age so that these systems do not once again fall into disrepair.[25]

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30 *Sustainable Development Law & Policy*

(20 points) Read the attached article on wastewater infrastructure in Appalachia
(a) What is the connection between wastewater and drinking water pollution in these communities?
(b) Given the overall wealth of the United States, why do you think there are still communities/individuals that cannot properly treat their wastewater or have no access to safe drinking water?
(c) As a future civil engineer, what could you personally do to assist with issues like these?
(d) Critically examine the potential solutions proposed by the author in the last paragraphs of the paper (Do you think they would work? Why or why not?).

Acknowledgements

This work is part of the Culturally Relevant and Responsive Teaching Fellowship program funded by the National Science Foundation via a grant to the Colleges of Education and Engineering lead by Drs. Haroon Stephen and Dr. Blanca Rincon. We thank Ph.D. candidate Kristine Espinoza and Dr. Choi for leading the workshop and bringing in interesting speakers during the workshop.

Evidence It Helps Students

- **Students responded positively to the articles and all student read the articles and answered the reflection questions**.
- **Interestingly, only 5-8% of the students mentioned discrimination or lack of political power as reasons for poor water/wastewater infrastructure in minority communities. The vast majority of students proposed an engineering solution to the issue** . There was no correlation between the student ethnic background and the solution proposed.
- Although students recognized the economic status of these communities was the reason for their poor water/wastewater infrastructure, they did not evaluate the reasons why these communities are marginalized. This was the case even with articles were discriminatory behavior towards these communities was specifically mentioned. Intentionally, students were not prompted in the assignments to either direction. The results revealed that some more direct reflection questions, regarding discrimination and social injustice in water/wastewater infrastructure may have to be asked in future assignments. Such an exercise may have a greater impact in increasing awareness of engineering students regarding social injustice in water/wastewater infrastructure.
- Because student answers were typically 100-200 words long, word mining of key terms maybe a good tool to use for evaluation in future assignments.
- **Excerpts of Students' Answers** :
- "The main reasons low-income communities suffer from wastewater treatment deficiencies is because it is expensive to upgrade to an approved on-site wastewater treatment system - The main reasons low-income communities suffer from wastewater treatment deficiencies is because it is expensive to upgrade to an approved on-site wastewater treatment system - One of the primary reasons for this deficiency is the high cost of onsite wastewater treatment systems - I believe that the reasons low-income communities suffer from wastewater infrastructure deficiencies is due to lack of demand and funding - These communities often suffer from wastewater infrastructure deficiencies because their poor economic standing prevents them from being able to afford to build and maintain the necessary infrastructure"
- "I believe that the reasons why lo income communities often suffer from wastewater infrastructure deficiencies include not being seen and heard by state and local government. -Lack of political will of local communities to require residents to have OWTS systems installed because of the punitive fines that may be leveled. Legacy and historical discrimination which prevented federal investment in sanitation infrastructure"

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