

Should Institutions of Higher Education Include Water Quality Issues in the Undergraduate Curriculum?

Letter to Editor

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INTRODUCTION

Should institutions of higher education include water quality issues in the undergraduate curriculum? Yes

Studying people's behavior is important when evaluating whether people should be worried about water quality or not. From this perspective, people should be worried because there are many studies that indicate that people have the right to be worried. Borisova, Brett, and Cassel (2010) studied public opinion about surface water and groundwater quality in Florida.

This paper summarized the survey that was done to examine Florida residents' awareness and attitudes about water quality and quantity issues and strategies to protect water resources.

The survey was mailed to 1,154 randomly selected Florida households in the fall of 2008 and spring of 2009; 523 households completed and returned the survey (45.5% response rate). Doria, Pidgeon and Hunter (2009) found that the media influences public perception. All these articles introduced the issue carefully, but still many other factors that were absent needed to be addressed. It is not surprising that people are apprehensive of and worry about water quality. People worried about water quality for these reasons:

First: History of waterborne disease and outbreaks

History is full of water crises that people will not forget easily. For example, the recent outbreak in the U.S was in Milwaukee, Wisconsin in 1993, where 1.5 million were infected by intestinal pathogens from the water, creating concerns about water quality.

The probability of cryptosporidiosis is related to the resistance of the oocysts of these bacteria to disinfection (Lisle & Rose, 1995). This huge number of infected people is not easy to remove from people's memory.

Second: People do not trust the treatment process.

Although many advanced techniques are used to keep water safe, possible contaminants still exist in the water because of the lack of wastewater plants and also because of chemical resistance. This makes treatment difficult. For example, one study analyzed stream water, raw, settled, filtered, and finished water supplies to identify 106 organic wastewater-related contaminants (OWCs). The results showed that in every sample from the stream water they detected about 40% OWCs, and in other samples about 10% had OWCs. The contaminants detected include selected prescription and non-prescription drugs and their metabolites, fragrance compounds, flame retardants and plasticizers, cosmetic compounds, and a solvent. Some chemicals were not detected in the finished water but they were detected in the stream and raw water (Stackelberg et al., 2004).

Third: Increased use of home filters and bottled water

Increased use of bottled water for drinking is an indicator that people do not trust tap water. Numerous studies show that consumers prefer bottled water due to a more acceptable taste and odor. Bruvold, Rosen and Pangborn (1975) studied consumer perceptions of taste and odor. The study found that consumers judge water quality negatively if the total dissolved solids (TDS) in drinking water increase. The study respondents considered

the water to be unacceptable if it contained more than 500 mg/l of total dissolved solids, and this was the main reason that motivated them to find alternative solutions (Bruvold et al., 1975).

Fourth: Environmental pollution across the world

Oil spills and other crises increase public apprehension. In a recent report by the Natural Resources Defense Council (NRDC), which was an annual survey of water quality and public notification in the U.S., many important results support the claim that people are apprehensive about water quality in many research studies. For example, the report focused on the beaches, or recreational water that people cannot stop using because it is as an important part of their life. The beach water quality was impacted by the oil spill last year. A total of 9,474 reports of oil were received since the oil spill was observed on June 15, 2011 (Dorfman & Rosselot, 2011). These kinds of environmental problems affect the quality of recreational and drinking water, indicating people should worry about the quality of their water.

Fifth: People are affected by the news.

News and other types of media publish the latest news about local and global water quality. People are affected by this news and try to treat their drinking water. For example, one famous news article in Muncie's *The Star Press* showed concern about nutrients in water in the last ten years. This is represented

in many articles such as Seth Slabaugh's article from 2006, in which he gives a brief history of the issue and says nutrient pollution has been a problem since 1913 in the Limberlost Creek watershed in Indiana due to hypoxia in the water body. People read the news and react because local news talks about problems present in the water, which to them means it is a real problem, and they have to do something to protect their health against disease and risk.

Should institutions of higher education include water quality issues in the undergraduate curriculum? No

First: People are satisfied with the taste and color.

People in some regions of the U.S are happy and satisfied with the drinking water. They do not notice any strange taste or color in their water. Taste and color are important for judging the quality of water for consumers. A report from Corona Research (2008) found that people should not worry about water quality. The report stated that residents in the eastern mountain region generally feel that their water quality is good. People in Idaho felt that their water was fantastic. Some participants said in this interview, "I brag on my water all the time." The study proved that people in this area do not have any problems with water quality. Also, people stated that they do not bother to test their water due to their high trust of the source of drinking water. This high level of trust from the local people about their sources of water gives no reason for people to worry about their water quality.

Second: Bottled water is not safe.

Bottled water is possible to contaminate. A study published by NRDC in March 1999 showed that in Houston, Texas, Superior Water, a bottled water brand, took city water and pumped it directly into bottles without any treatment (Olson, 1999). That means that people should not worry about the water, because if they relied on bottled water, they were drinking tap water. Also demonstrating that bottled water is not any better than tap water, a study entitled "Bottled water contains disinfection byproducts, fertilizer residue, and pain medication" was published in October 2008. The report stated that the bottled water industry is not required to disclose the test results. The report mentioned that consumers now believe that bottled water is not safe, and that it is expensive (Dorfma & Rosselot, 2011).

Third: Efforts to regulate water

Tap water is regulated by the Environmental Protection Agency (EPA), which uses precise regulations, and they act very quickly when any parameter exceeds the maximum level. However, the Food and Drug Administration (FDA) regulates bottled water and is not as strong as the EPA. This agency does not have strong regulations for coliform bacteria. About 100 incidences have been recorded because of contaminated bottled water (Lewis, 2010).

Fourth: Low cost of tap water

In the U.S., bottled water sales are very high; about 9 billion gallons of bottled water is consumed per year. People spend hundreds of millions of dollars on bottled water (Lewis, 2010). Studies that have found contaminants in bottled water make people think differently, that bottled water is not a better option to rely on for daily use. For example, research by Lalumandier and Ayers investigated the level of fluoride and bacterial content in five brands of bottled water and three tap water plants in Cleveland, Ohio. The study showed that only 5% of bottled water in the study met the fluoride requirement. Meanwhile, 100% of tap water met the state fluoride requirements. The study confirmed that bottled water samples have an unacceptable rate of fluoride and bacterial levels (Lalumandier & Ayers, 2009).

It is difficult for people to notice the difference between tap water and bottled water because of the similarity of taste and color. Gleick wrote that most spring water was bottled as natural water without much treatment. A study found that 20% of U.S. spring water has *Giardia* and *Cryptosporidium*. This makes people suspicious about spring water that is bottled, and people spend money for that quality (as cited in Lewis, 2010).

Fifth: People hear about serious problems coming from food, soil and other places

Many other problems in life seem more serious compared with water quality, such as food poisoning. An oil spill can cause fish to be contaminated with chemicals. Cumulative chemical concentrations in aquatic microorganisms can reach the food chain and cause cancer in people. Now people prefer to eat organic food and organic products to have good food. Besides this, bottled water can have negative consequences for the environment because of the high amount of waste generated. This waste can cause environmental degradation and be very costly. I think people can invest this money in stronger net municipal water distribution systems (Lewis, 2010). The above reasons lead people to drink tap water and not trust bottled water.

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Sociological Reconstructionism

Dear Editor:

I am writing to you after I read an article in the Star Press. The article published some news about water quality in Muncie. People have different attitudes towards the safety of water. I do not know whether they are affected by news from the Star Press or not.

The article mentioned some pollutants that have contaminated the White River. These pollutants are nitrates. The area surrounding the river is an agricultural area, and farmers use fertilizers that are rich in nitrate and phosphorus. Also, farmers apply some applications that help them on their farms, but they do not realize that they are increasing nitrate in the water body by using methods such as till drainage. Many environmental problems related to the water are still not

solved yet. Scientists studied and identified the contamination in the area but there are still some barriers that prevent them from applying the appropriate solution to manage these problems.

In order to focus the article from the Sociological Reconstructionism perspective, I need to focus on the groups who might be affected by this topic. First, let us all imagine that we studied two groups of people. The first group is American (native) and has lived in the area for more than 10 years. The second group is an international group who also used to live here in Muncie, Indiana. Both groups in this study will be educated and know a little or more about this issue. The question is: Are they worried about water quality? My expectation is that, yes, they are

worried about water. As I am one from the international group, I will say that, yes, most of my American friends drink bottled water, because they are either lazy or afraid of the tap water. The international group, I think, is more afraid because they think America is an industrial country and it has more problems and different pollutants in the water. Or, they are more satisfied with the water, because they think that America has a good method of treatment and can solve its problems very well. Studying the social perspective is very important in order to observe the relationships between factors that could affect people's behavior, such as religion, academic background, ethics, and so on. Best

Arij Mousa

Cultural Anthropology

Dear Editor:

I would like to share something with you regarding the issue of water quality and anthropological holistic emphasis. According to the Gale Encyclopedia of Public Health, "Sir Edward Burnett Tylor (1832–1917) one of the founders of anthropology, defined culture as 'that *complex whole* which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society' (Tylor 1871, p. 1, emphasis added). It is the holistic emphasis of cultural anthropology that distinguishes it most clearly from other related disciplines. . . . [A]n anthropologist may focus the research on a particular dimension of culture, such as religion or political organization, but that dimension will also be described in terms of its relationship to the 'complex whole' of the local culture".

To observe the chronological status of the issue, the first question that comes to my mind is, "When did people notice that they should be worried about water and start taking measures to keep themselves safe, such as using filters at home or drinking bottled water?"

I do not know when people started worrying about water like this and what the reasons are for it. I remember that my father drank directly from the well without any treatment for the water. People never complained about water in 1940. What makes people worried about water quality now? Times have changed, and the feeling of worry has also changed. Also, I connect the feeling of unsafe water with the media. What I mean is, when people

started publishing good articles related to the safety of water quality, people became more confident, and when the media relayed bad news about water, people got more worried. Background and other factors related to water quality might affect people's behavior. People are sometimes not aware of their behavior and the reasons that make them afraid or accepting of their water source.

Water quality research and published papers have studied many different issues. Usually the researches conduct the most serious issue in that time for example examining the microbial contents of the water source after the big outbreak. Also, the oil spills crisis last year make the research focus on the chemical pollution. Moreover the research sometimes it depends on how much claims they have from people. Monitoring and good assessment is the important step to evaluate the problem. The most important concern that people sometimes they do not trust this monitoring. They have many reasons for that such as lack of skills and lack of technology. Also people think sometimes that the federal regulation needs to be updated to regulate new pollutants.

Dear editor it is confusing and hard to estimate how much information that we need in order to put serious steps to help people. Observing the reasons are important and necessary to judge the issue. Cultural anthropology aspect is the hook that used to pull out all the possible reasons and display them in good order.

Best

Arij Mousa

Sociological Resistance

Dear IDEM representative:

I know that you are working hard to make people happy and satisfied with water quality. The area has many different types of resources that people rely on. The most important issue that I noticed is that people think that the ground water is not safe to drink and suspect many kinds of pollutants. Let me describe my view about why people resist government claims about ground water such as in areas that have oil and gas companies. People are not happy about ground water, because the method of extracting the oil by mixing a huge amount of water with chemicals and re-injecting into the aquifer makes people report changes in

water quality “in Arkansas, Colorado, Pennsylvania, Texas, Virginia, West Virginia and Wyoming, where residents have [also] reported changes in water . . . quantity following fracturing operations” (Natural Resources Defense Council, 2011). This type of extracting is

called hydraulic fracturing, or fracking. Using chemicals during the extracting makes people apprehensive of water quality. Regulations and the federal process might give good evidence or real steps to treat water, but the residents have the right to accept or deny. People just depend on unknown sources of information. Sometimes they have good evidence and sometimes they do not. If you try to analyze their apprehension toward the ground water in this case, maybe people noticed some change in the water quality, such as the taste and odor, which are general characteristics of water. In my point of view, the residents should have the right to judge their source of drinking water. This is personal freedom. Recreational water is also a type of general source that all residents should trust. It is used for fishing, swimming, and other activities, and this is considered an important part of their life, and this also gives them the right to accept this water or complain. People are apprehensive when they observe that their creek is full of dirt, especially during rainfall.

Dear IDEM representative,

to make people more confident about ground water, you should find multiple solutions to gain people’s trust, if possible, and if they refuse, they should have scientific reasons for their apprehension. The country’s development involves many different directions for investing money and developing technology to extract and produce many different products to enhance the economy of the country, but this issue could delay production. Let me give you a simple example: An industry produces a good product, and this process ends with throwing waste in the creek, and the industry is also pretreating the water before sending it to the creek. I myself will not drink directly from the creek, because I know it has been polluted, and chemicals such as chlorine and others have negative effects, such as carcinogenic effects on human health. Also, I know that some bottled water companies just fill bottles with the city source, so I will probably choose to drink milk or juice rather than water.

Finally, considering that resistance to federal law can be expected, you should act carefully as a federal agency. Ads in the news and TV programs could help if you have good research to support your claim that the ground water is safe and people should not be worried about the quality and safety of water. On the other hand, people in such agencies should give preference to people’s needs and try to satisfy them by finding a way to help people know the reason why they are worried about water quality.

Department of energy and oil.

Feminist theory (Gender Difference)

Dear Dr.Amal,

I am writing to you about an issue that I think you will understand as a female that holds a higher position in an academic setting. I was looking for somebody that could understand the issue from a feminist perspective, My mind told me that I should write you.

Writing from a feminist perspective means finding out the difference in thinking between women and men. I do not know if this is true or not. Dear madam, I am presenting my issue about whether people should be worried about water quality. I would like to have a feminist perspective as a different point of view. You represent the educated female, and your response is very important to me in discussing the idea from this perspective.

Water quality as a general topic is very important for everybody, and to make this topic more attractive, let us frame this issue as more insightful for women. You will ask me why? Men and women are human and all drink water. But let me ask you this: Have you ever asked yourself if women are more careful and worried about water than men? I am expecting either a “yes” or “no.” If you answer me with a “no,” I don’t have to know the reason for that.

The most important answer for me is “yes.” This is the answer which needs more explanation from your point of view as a higher class educated woman. I am curious to know your response. I will also let you share some feminist perspectives as a woman, too.

I would like to translate the issue in other words to make it look more feminist. Women, in my opinion, can sense safety in their bodies as mothers, the feeling during her pregnancy allows her to feel the meaning of safety, the feeling of taking care of her fetus inside her body, the feeling when she sees her baby after delivery, that he is safe and the fluid and blood were feeding him and the confidence that everything was sterile gives her the sense that women are very careful about water.

From the first months until two years the baby gets his food from the safest place, his or her mother’s body, as breast milk. After that, when the baby grows up, the mother wants to have a relatively safe place for her child, as safe as her body was.

This perspective leads mothers to boil water for their babies when they prepare powdered milk, thinking they are careful and want a safe drink for their children. The idea raised from this perspective is that women are close to their children and are a responsible source of food and safety. Therefore, I am

expecting that women will have a higher level of apprehension about water quality compared to men.

Dear President,

Maybe you have another interpretation of this issue to contribute to this framework. You have the right to say no, too, that there is no difference between men and women in terms of their ideas of water quality. I would

appreciate your view and consider your idea as an expert because you are dealing on a daily basis with male and female issues, and your mind thinks in different ways according to the issue or what is in front of you.

The situation could change from time to time, and also people's thinking changes along with the times and the situation, but human feeling might store some old memory that helps him or her reconstruct a modern viewpoint, and this is common in this day because America is a multicultural place, full of differences, and it has a fast pace of development in the world, and people are adjusting according to this development. Many different views could accumulate at the end and result either in good things or as a negative and end up costing this development. Take care, dear President. I hope to hear from you soon. Your response is very important to me.

Again, you have the right not to respond to me. If you think this topic is odd and you do not have anything to add, I fully understand and thank you very much.

Arij Mousi

Social-economic perspective:

Dear CEO of Aquafina bottled water:

I writing to you, sir, to let you know that I am from a water treatment plant in this area of the world, and I am an expert in my field, and I did much research that reveals that our source of water in this city is completely safe. We have not detected any types of pollutants. Also, the water quality of our sources meet the federal water standards. We are making efforts to gain the people's trust of our city water, but the problem is that your company increased its production rate and people either find it at a cheap rate or think it is easy to handle. That is why you have a high rate of disruption. This city also has a large campus, Ball State University, which gives the issue a bit more complexity.

When we observe the age level in this city during the fall semester, I would predict that 20-30 year olds will be the dominant age on this campus. Also, there is a huge diversity of students from around 80 countries, all coming from different cultures from different regions on the earth. The university provides all types of water on campus, from the drinking fountains everywhere, bottled

water in vending machines, and selling water in the restaurants on campus. I do not know what will happen to your marketing if the students stop paying for these kinds

of bottled water. Of course, there could be many reasons for this – for example, by passing a law that forbids your company to provide the campus as the only supplier for Ball State. The second reason is that students fully understand that the tap water is safer than bottled water.

This awareness could be developed through Ball State news or TV. What is your response in this case? Could you provide the competitive advertisements to challenge that? It is a difficult task I think. Changing personal behavior to fit the niche of the community economy is a hard task. I do not know how strong your claims in this matter are. Do you think these differences and the diversity of this campus will affect the marketing rate if there was a restriction strategy or action taken to change the students' behavior?

I do not know what kind of difference this would make for your company. Let me know your view of point according to this Socio-Economic perspective.

I know it is hard to let your company lose money. Do you have a solution for that? If your company does not meet the standards of the federal law, what do you think will happen? Or if the people start to get afraid and worried about their health? Can you tell them that your company does not meet the federal standard? When you will be able to gain their confidence again?

What ways will you use to reach the point where people trust your company? I believe you put much effort and time into this because people have a negative attitude toward bottled water, as generally they do not care about which brand they use. To me, all bottled water is the same. I do not have any preference and I know, because of my background, that the water quality of both sources (bottled /tap) have minimum and maximum risks.

The power to choose which one depends on people's attitude and acceptance. I am sorry if I have caused any inconvenience by this letter, but your response as a businessman is important, and you serve as an effective person in this company, and you are one person forming a part of this whole.

You can explain your view from two sides - as a normal person and as a businessman who cares about his future and the economy of this community. If you have any extra explanation, please let me know. I would be happy to help you. You can find my contact number by googling my name. I am Arij Mousai from Tripoli University .

Arij Mous

Political Cartoon:



Ref: <http://www.cagle.com/#>

I chose this cartoon because it describes the most common public apprehension toward water quality. People from this cartoon do not trust the water. The cartoon infers that waste water utilities, business interests, agricultural interests and state regulations are not doing anything for water quality. The cartoon describes the actual action for testing water quality and shows that the level of trust is very low because they say even their tears are not so clean and do not meet the water standard. Making cartoons like this describes people's trust and shows how important it is to check those agencies. If their tears are not clean, it means the level of trust is so bad, because normally tears are sterile. The opposite view, according to my prediction, the cartoon could infer that many pollutants have been increased and the agencies and government sectors are not able to follow up all this changing by using the old regulations. The cartoon describes the weakness of the agencies and the federal regulation. This makes the people working hard to retest and assess the water quality.

The cartoon showed that this assessment found that people should worry about water quality, and also people could take other steps toward improving water quality. People are affected by many different types of advertisement, news, cartoons, TV, articles and others. This cartoon is funny and objective direct to the point of people apprehension I like this cartoon because it summarizes the whole issue in a nice picture that has a strong action. Public media have the right to send any message to the people by different types.

Cartoon in my opinion is a valid and appropriate way for all age .It does not need a high quality writing the simple person cannot understand. The most important the idea for the cartoon and the action that contain the big issue and sometimes the solution too in one cartoon.

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