Overview:

A transferable module is presented that brings sustainability topics into a core chemical engineering fluid dynamics course. A topic was chosen based on technical applicability to the course and current debate on the topic. In this case, hydraulic fracturing ('fracking') was chosen for the connection to course content (e.g. pumps, porous media flows) and its widespread debate in the United States. 

ASEE PRISM Features, “Get Fracking” – Thomas K. Grose, 2011

Results Fall 2017:

Understanding and Support:

Bias discussion:

Implementation:

1. Students surveyed on understanding of and opinion on topics within fracking
2. Students watched two short videos
3. Theme areas: science/technology, economics, policy, society, and the environment
4. In-class, students in their groups engaged in their own research
5. One rep from each area summarized salient points to the class with discussion

Specific Task | Time (min)
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Survey questions (pre) | 5
Videos and discussion | 15
In-class research | 40
Discussion | 10
Survey questions (post) | 5

Use in other courses:

Current:

ECHM 205CS. Energy and Sustainability: Students from all academic backgrounds
ECHM 405. Sustainable Energy: Pairing energy with material science and thermodynamics

Future Examples:

ECHM 201: Material and Energy Balances – Topic: Chemical Production Plants
ECHM 322: Heat Transfer – Topic: Nuclear Reactors

Did you change your opinion? If Yes; what factor(s) persuaded you to do so?

Economic and ecological impacts were greater than I thought.

“Did you find this class format more effective than a traditional lecture? If Yes; in what ways?”

It was more engaging and required you to be responsible for your learning – no dozing off

It was engaging forcing critical thinking it reminded me of a media lit class in high school where differing views are valued and encouraged

Did you find this class format more effective than a traditional lecture? If Yes; in what ways?

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Helps facilitate ideas however doesn’t allow for as in depth research as an expert may be able to provide. Good in moderation

It was engaging forcing critical thinking it reminded me of a media lit class in high school where differing views are valued and encouraged

I love hearing other perspectives (with data to back those). Doing research (albeit brief) really aids in discovering info to help increase knowledge

Talking to other students helped me to develop my own opinion rather than being told what was the "right" answer.

Any suggestions for improvement?

Suggest a wider array of sources

Emphasis using scholarly resources more. Have research happen before class. I had no time to read the 20 page papers that had the information I needed.

More time/more debate over the issue.

Many groups. Mine included seemed to present information that was very one sided. Our "scribe" only presented negative economic impacts, though there are many benefits. I think that if groups were required to have a pros and cons side there would be a better understanding of both sides.

More videos from different viewpoints