CURE

Thinking about starting up or overhauling a Course-Based Research Experience? See what others are doing and get some ideas to launch your program.

Scott Bur	Attendance #: 14

Please provide a BRIEF session summary:

Q: Who is using CUREs in class?

A:'Baby CURE' in instrumental methods, biochem (BASIL network), organic chem

Q: What is the difference between a guided inquiry and a CURE?

A: The CURE model from Research Corp: 5 key features:

1) Practicing science
2) Iterative approaches
3) discovery/inquiry
4) Collaboration
5) Science relevance

In a CURE nobody knows results; in GI, instructor knows/expects results

rescorp.org/news/2018/06/expanding-the-cure-model-course-based-undergraduate-research-experience

How Scott Bur got started with CUREs; considering what students are obsessing about because they think it supposed to be challenging & take more time doing it.

- GI example: Reframed the experiment to focus on a question rather than the techniques– this opens up a variable (in his case, use different molecules). Another prompt: 'determining a protocol for a company'
- CURE example: brought a part of his own research into the ochem (2nd) teaching lab. Started with a general synth route, opened up a variable. Need to teach how to search literature and what types of literature to look at/know what they are looking for. Need to teach writing to communicate results. Assessment: failure needs to be part of this; cannot use purity, etc– he grades on final report. Flow of course: teach the initial target molecule synth all together for the first half then they do research molecules for the second half. Took multiple iterations to figure out how to teach & assess CURE.

Q: How do you deal with having enough projects? How can it continue for multiple years?

A: Picked a synthetic route that has many, many iterations.

Need to clearly communicate if students may or may not be co-author on paper.

Q: If not an organic (or med chem) chemistry, how do we find a project with enough iterations.

A: Sometimes not own research but iteration on an existing experiment/learning goal. Consider methodology transfer to multiple applications. Community of others' projects may be useful. Multiple students doing the same reaction would be useful for understanding anyway.

Need to clearly prepare students for failure– knowing it doesn't work is important too. But motivated by knowing new information.

One example: pick a JChemEd article & try to reproduce work, troubleshooting. Run it as is and then propose a way to modify.

Another example: partner with another course or a research group at a university. Collaborators/partnerships at universities can be helpful.

Q: How much of the lab course is the CURE?

A: Sometimes whole semester. Sometimes module within course.

Challenge: journal access

Assessment:

- Important to have clear criteria
    - record -keeping
    - Professionalism
    - Using feedback critically
    - Using terms & concepts
- self-assessment (with evidence, examples, based on criteria, clear- what to do next)
- Poster or paper
    - Generate scientific figure with each experiment to build poster or paper
    - Give feedback early; respond to feedback & get better
    - Makes creating poster/paper easier at the end
    - Report what happened in each experiment, whether it 'worked' or not
- Lab notebook (emphasis on good notebook skills)
    - Quizzes throughout the term & at end to find (with pg #) specific information
    - Forces students to assess if notebook is useful
    - SAVES TIME of notebook grading (and don't need to take notebooks from them)
- Assessing student skills
- Assessing course learning objectives
- Formative vs summative assessments and developmental assessment
    - One developmental assessment resource (evaluateUR-CURE) https://serc.carleton.edu/evaluateur/cure/index.html
    - CURE & SURE surveys from Grinnell https://sure.sites.grinnell.edu/sure-iii/

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What is fun about teaching a CURE?

- Students reaching ‘expert’ level in one thing; students teach you about their projects
- Controlled chaos

Research course idea: stand alone course; model of a course then other faculty could use the course shell with their own topic.

There are many CURE networks that you may be able to plug into

Students may be able to publish in a micro publication journal