Faculty Learning Community: Course-Based (embedded) Undergraduate Research Experience (CURE) Best Practices and Reference List

What is undergraduate Research?

According to the Council on Undergraduate Research (CUR) "undergraduate research, scholarship, and creative inquiry is fundamentally a pedagogical approach to teaching and learning. With an emphasis on process, CUR defines undergraduate research as: A mentored investigation or creative inquiry conducted by undergraduates that seeks to make a scholarly or artistic contribution to knowledge." ***UL Lafayette defines a student research experience (SRE) as a sustained effort by a student toapply subject knowledge, skills, and abilities to a project that is valued by the discipline***. Like many institutions, the challenge UL Lafayette faces is providing authentic, mentored experiences for all the students who desire these high impact activities. Course-based (embedded) undergraduate research experiences (CUREs) allows a single faculty member to impact more students in a single plan or activity. However, learning to implement a CURE requires time and training.

"Course-based undergraduate research experiences (CUREs), by definition, are learning experiences in which whole classes of students address a research question or problem with unknown outcomes or solutions that are of interest to external stakeholders. They were originally devised to address a major goal of national reform efforts in life science education to expand research involving undergraduate students (**American Association for the Advancement of Science [AAAS] 2011; National Research Council 2003**)." *Jacqueline McLaughlin*

While there are a lot of virtual experiences that can provide a multitude of possible outcomes to a virtual experiment and teach students skills, authentic research experiences cannot be pre-recorded. They are harder to design in any class environment. Adding them to an online course presents unique challenges, such as engaging students and producing "teachable moments."

The information supplied in this document is designed to aid faculty in the process of designing a CURE. We (The 22/23 Distance Learning CURE-FLC) share references and definitions that should be understood.

Definitions:

Undergraduate research and Student Research Experiences are described above. Our group found it important to settle on a working definition of these phrases. There is a large amount of literature defining what undergraduate research is and what an authentic experience must include. UL Lafayette has approved a definition and a best-practice would to include adherence to those definitions when you are working.

SUREs: Summer Undergraduate Research Experience
This event is a summer program similar in design to an internship. The goal is to train undergraduate students often on a specific research topic. In some cases, a specific discipline is the focus. The National Science Foundation's (NSF) Research Experience for Undergraduates (REU) program often funds SUREs.

PUREs: Program Undergraduate Research Experience: The Advance Student Research Experience (ASRE) Pathways that UL Lafayette that each department is building are examples of PUREs because they involve multiple events, multiple professional stakeholders, and multiple, but well-planned types of experiences to complete.

MUREs: Mentored Undergraduate Research Experience; sometimes also called UREs Undergraduate Research Experience. This is often what students and faculty think of when the word "research" is used. Often only STEM students think this type of experience applies to them. Non-STEM students are often unsure or do not think "research" is part of

their opportunities. MUREs are fabulous experiences for students, however, there are time and work intensive for faculty. Therefore, they are limited based on people power. In some cases, the faculty are too busy or are already serving all the student they can. In other cases, the students are not interested in the MURE opportunities that are available to them.

CUREs: Course-embedded Undergraduate Research Experience
The name describes the actions for this classification of SRE. There are some common ideas that any CURE should follow. This criterion is approved is approved by UL Lafayette's administration and the Advance Program
   Course Embedded SRE Criteria:
      1. The SRE is embedded into the course curriculum.
      2. All students in the class engage in the SRE in some fashion.
      3. Outcomes of the SRE are unknown beforehand.
      4. Students work collaboratively as much as possible.
      5. SRE projects introduce students to the professional research methodologies of the discipline.
      6. Outcomes of the SRE are communicated to a stakeholder that is not the course instructor of record.

Read more about MURE(URE) vs CURE: https://www.science.org/doi/full/10.1126/science.1261757

Tips from the team:

- CUREs will allow me as a faculty member to accomplish some of my research goals too.

- Preparation takes time and trying to rush the process will not work. Even though you know the discipline well and could do the work yourself with ease, it takes planning and time to allow the students to complete the work and then learn from it. Use the entire semester.

- Small projects are best when starting. Pick one skill or hypothesis to address and think simply. The process is part of the learning activity. The product does not have to be perfect.

- Don't make the job harder than it is. If your course will easily accommodate a CURE, great. Don't forget that sharing the work with someone outside of the class is required and in may be the only thing you need to add to meet the guidelines for a CURE.

- Evaluating CURE-related deliverables are more challenging than traditional assignments.

- CUREs, like other active learning methods, requires more class and course time be dedicated to process: faculty need to gauge what is critical content for the scope of a course and how best to deliver it.

- The loss of content may seem irredeemable, but getting students to understand the research process is more important than ever: anecdotes are not the basis for an argument in scholarship and science.

- Most faculty are already doing some sort of research (individual) in the courses we teach, but they may not be assessing their activities or sharing the product of their student's work.

- It is okay that the outcome of my CURE is not the same as I expected.

- Students hate group work (especially in the online environment) and that is OKAY. Let them hate it and let them figure it out on their OWN.

- I should not be afraid to be more creative in what I assign and how I assess students. There is significant value in the research process in place of objective testing. CUREs are a great way to achieve my intended course goals.

- CUREs allow the students to take ownership over their ideas as well as allows them to see the scientific method in action rather than as an abstract concept.

- Group work is hard, doing a CURE in a lower-level course is hard, but I think doing this together will give students the confidence they need to succeed. Different students have different strengths, and they can learn to mentor each other.

References:

Publication:

[Virtually the Same? Evaluating the Effectiveness of Remote Undergraduate Research Experiences](#)

[Building motivationally supportive course-based research experiences for undergraduates: a self-determination theory perspective](#)

[Course-based Undergraduate Research Experiences: Current knowledge and future directions1](#)

[Course-based Undergraduate Research Experiences: Advancing CU Boulder's Strategic Goals](#)

[Assessment of Course-Based Undergraduate Research Experiences: A Meeting Report](#)

[Fear of the CURE: A Beginner's Guide to Overcoming Barriers in Creating a Course-Based Undergraduate Research Experience](#)

[Characteristics of Excellence in Undergraduate Research (COEUR)](#)

[Course-Based Undergraduate Research: Educational Equity and High-Impact Practice](#)

Undergraduate Research Programs:

[PennState](#)

[University of Calgary](#)

[Xavier](#)

[Howard Hughes Medical Institute](#)

[The University of Arizona](#)

Find more information at Advance.louisiana.edu