BASIL

Sustainable CURE implementation Across Diverse Institution Types

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Abstract

Course-based Undergraduate Research Experiences (CUREs) are recognized for their potential to increase access to research in undergraduate STEM. While CUREs are becoming increasingly widespread, there have been few systematic studies of the processes by which CUREs are adopted, implemented, and sustained.

Need: There is a noticeable lack of research on CURE development and implementation in minority-serving institutions (MSI) and two-year contexts. Few studies have examined the skills and pedagogical support required by faculty as they integrate CUREs into their curricula. The process through which faculty decide to adopt new instructional approaches is often unique, affected by both personal and contextual factors. Our goal is to increase CURE adoption and sustainability by understanding the supports, challenges, and barriers across institutional contexts.

Guiding Questions: Institutions can have quite different infrastructures and support for teaching innovation, which are likely to affect instructors' decisions to adopt and continue using CUREs. Our investigation will occur within the context of the Biochemistry Authentic Scientific Inquiry Lab (BASIL, basilbiochem.org) project, a CURE where students apply in vitro and in silico methods to predict the function of proteins that lack functional annotation in the Protein Data Bank. BASIL modules are the product of two previous NSF IUSE projects. Notably, instructors have used BASIL modules to create a variety of CURE experiences that align with the specific course-level learning outcomes in their unique local context. The BASIL curriculum affords a well-positioned context for this investigation because of its inherent flexibility and the growing community of instructors interested in adopting BASIL.

Outcomes: We will leverage the modular design of the BASIL CURE and the growing BASIL community to characterize how institutional context influences CURE implementation and sustainability. The BASIL community currently includes Primarily Undergraduate Institutions (PUIs) and ~30% of interested and/or engaged institutions are Hispanic-Serving or emerging Hispanic-Serving Institutions (HSIs). We plan to expand to include Historically Black Colleges and Universities (HBCUs) and community colleges (CCs). This project will contribute to the existing CURE literature by characterizing the barriers to CURE adoption and mechanisms that support sustained CURE implementation across institutional contexts.

Broader Impacts: The knowledge generated will be applicable to other CUREs and can be used in national efforts to increase and more clearly categorize CURE implementation in a greater variety of institution types by designing supports that are responsive to the challenges faced by faculty within their own institutional contexts. We anticipate that increased CURE implementation across a wide range of institutions will ultimately increase participation and inclusion in STEM and contribute to a more diverse STEM workforce.

Critical Components of a CURE

Need

➢ Research plays an important role in undergraduate education but access is often limited

➢ Laboratory courses often rely on confirmatory or "cookbook" experiments

➢ Lack of access to research is especially problematic as institutions with little or no infrastructure for research, including PUIs, community colleges and MSIs

➢ CUREs can help but are disproportionately found at research-intensive universities and liberal arts colleges

➢ Those who want to use CUREs to increase participation and persistence for students of diverse backgrounds need to understand what factors affect cure implementation and sustainability across institutional contexts

Guiding Questions

What are the supports for and barriers to CURE implementation and sustainability across institution types?

What is the relationship between institutional context and variations in CURE implementation across institution type?

How can we most effectively facilitate CURE implementation and sustainability in diverse contexts through faculty development?

Integration with the BASIL CURE

Why BASIL?
Flexible implementation

Current institutional types participating in the BASIL CURE — Will diversify

Carnegie Classification		Count
	AAA	3
	R1 and R2	6
	Doct/prof	7
	Bacc	22
	Masters 1/2/3	24
Minority Serving Institutions	HBCU	0
	TCU	0
	HSI	8
	emerging HSI	10
	non-MSI	44
Primarily Undergraduate Institutions	non-PUI	6
	PUI	56

Institution Count: 62

Self-reported Barriers to Implementation of the BASIL CURE—How will these change when the types of institutions participating are expanded?

Anticipated Outcomes

➢ Development of a **series of workshops** for recruitment, support, assessment training in Discipline Based Educational (DBER)

➢ Increased **diversity of institutions** participating in the BASIL CURE

➢ Identification of **supports for and barriers to CURE implementation**

➢ Development of **Faculty Learning Communities** to support identified challenges

➢ Development and dissemination of a **CURE Critical Components Rubric** to generate initial descriptive accounts of BASIL implementation that can be applied to other CUREs

➢ **Multi-case study** findings and dissemination about the relationship between institutional context and variations in implementation

➢ A virtual **Community Sustainability Meeting** to share findings, reflect on mechanisms for CURE implementation and sustainability

	Year 1	Year 2	Year 3	Year 4	Year 5
Leadership Meeting	1P				
Recruitment Workshops	2V, 2P	2V, 2P	2V, 2P		
Support Workshops	2V	4V	4V	4V	
Assessment Workshops-New Participants		1V, 1P	1V, 2P	1V, 1P	
PEER Workshops		1P°	1P	1P	
Community Sustainability Meeting					V

Broader Impacts

➢ The knowledge generated will be applicable to other CUREs and can be used in national efforts to increase CURE implementation in a greater variety of institution types by designing supports that are responsive to the challenges faced by faculty within their own institutional contexts.

➢ We anticipate that increased CURE implementation across a wide range of institutions will ultimately increase participation and inclusion in STEM and contribute to a more diverse STEM workforce.

Request for Community Feedback

➢ What has been most effective for you when recruiting new participants to your project?

➢ What do you feel are the most effective ways for us to recruit HBCUs, HSIs, MSIs, Community Colleges and Tribal Colleges? Options include conferences, on-site or virtual.

➢ What is the best approach for developing and sustaining leadership in a project as it expands?
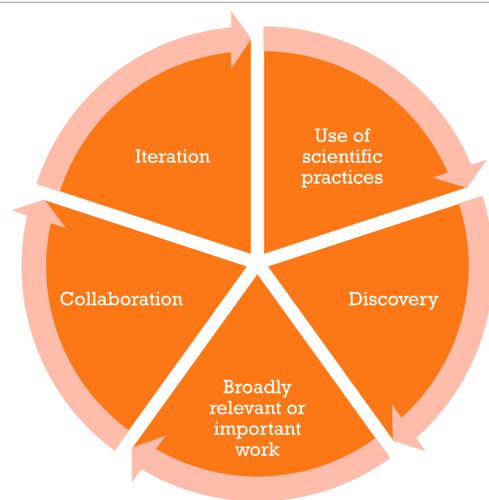
Citations

Auchincloss, L. C., Laursen, S. L., Branchaw, J. L., Eagan, K., Graham, M., Hanauer, D. I., Lawrie, G., McLinn, C. M., Pelaez, N., Rowland, S., Towns, M., Trautmann, N. M., Varma-Nelson, P., Weston, T. J., & Dolan, E. L. (2014). *Assessment of course-based undergraduate research experiences: a meeting report*. CBE life sciences education, 13(1), 29–40. https://doi.org/10.1187/cbe.14-01-0004

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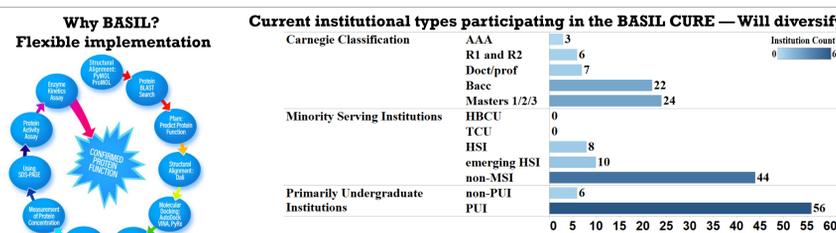
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