

Annotated Bibliography

ENGR 3510 Project

January 15, 2020

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. Make sure to put your initials. It will do weird things to the text; that's fine. Citations are made with [1] where Dolan2016 could be replaced with any citation key.

CB: An annotated bibliography is a list of references with descriptions summarizing their content and importance to the work at hand.

1. [1] "Course-based Undergraduate Research Experiences: Current knowledge and future directions" Course-based Undergraduate Research Experiences (CUREs) have emerged in recent years in response to studies showing the benefits of undergraduate research internships and to national calls to engage many more STEM undergraduates in doing research. The purpose of this paper is to summarize the state of knowledge about CURE instruction, including shortcomings in the knowledge base and recommendations for future research and practice. CUREs are distinctive as learning environments because they afford students opportunities to make discoveries that are of interest to the broader scientific community or other stakeholders outside the classroom. CUREs also engage students in iterative work, during which they repeat and build on aspects of their own and others' work in order to ensure the trustworthiness of their findings and generate meaningful scientific knowledge. Communication and collaboration are thought to be important elements of effective CUREs, but the importance of producing scientific publications versus other meaningful products remains an area of debate. Numerous student-, faculty-, and institution-level goals have driven CURE development, especially in the life sciences and chemistry. These goals include the desire to improve students' persistence and success in STEM and in college, to make research accessible to a larger and more diverse group of students, and integrate to the teaching and research efforts of faculty. Introductory-level CUREs are thought to exert greater influence students' educational and career trajectories, while upper-level CUREs are useful for to students confirm their interest in pursuing science-research related educational or career paths. Small-and large-scale CUREs have been developed that engage students in addressing common and diverse research questions. CUREs themselves vary widely in duration, costs, and operations. There are only a few published examples of CURE being implemented in two-year colleges or minority-serving institutions. Students who participate in CUREs develop content knowledge and technical skills specific to the area of research. They also develop confidence in their ability to do science and a sense of ownership of

their research. Few studies of CUREs to date make use of valid and reliable measures of student outcomes, or study designs and methods that control for student-level differences. Additional research is needed that makes use of theory and methods from the social sciences to more fully understand how CUREs operate, how students and faculty benefit from this unique learning environment, and how challenges to adopting, implementing, and sustaining CUREs can be overcome.

References

- [1] Erin L Dolan. “Course-based Undergraduate Research Experiences: Current knowledge and future directions”. In: *National Research Council Commissioned Paper* (2016), pp. 1–34. URL: http://sites.nationalacademies.org/cs/groups/dbasse/site/documents/webpage/dbasse{_}177288.pdf.