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Title: Developing and Utilizing Course-Based Undergraduate Research Experiences (CUREs) for Student Outcomes and Career Readiness

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***Lykilorð* — Undergraduate Research, Active Learning, Specifications Grading, Career Readiness**

I. Inngangur

Engaging students deeply in course material remains a persistent challenge in higher education. Instructors must balance the demands of covering extensive content while simultaneously providing experiential learning opportunities that prepare students for life beyond graduation. Course-Based Undergraduate Research Experiences (CUREs) offer a transformative educational model that integrates research into classroom settings, providing students with hands-on opportunities to develop critical skills necessary for academic and career success (Malachowski et al., 2024; Hensel, 2018; Mekolichick, 2023). CUREs foster essential competencies such as critical thinking, communication, and problem-solving, while promoting equity by expanding research opportunities to traditionally underrepresented students.

CUREs are a novel form of classroom-based courses that offer students hands-on experience doing research and are a model of undergraduate research that involves students in a project that is an integral part of their education. CUREs are designed to be collaborative, iterative, and ongoing, and can address unresolved problems or unanswered questions. CUREs may allow faculty researchers the opportunity to generate new information within their discipline. CUREs can be implemented in a variety of ways, including introductory courses, upper division courses, or modules within a larger course. Students work on research questions based on the course content or on a faculty member's field of study. Students may participate in activities such as reviewing literature, analyzing results, and sharing research outcomes and recommendations for further work.

As a form of undergraduate research, CUREs are a “high impact practice” (Kuh, 2008) and provide students with academic experience that enhances their individual growth and development. These active learning practices promote deep learning through student engagement as measured by the National Survey on Student Engagement (NSSE). This presentation will explore the benefits of CUREs, strategies for constructing and developing CUREs, and key practices to ensure their successful implementation. The presentation will put our work in the broader context of undergraduate research and CUREs where students engage in authentic research, gain confidence, prepare for future careers in academia or industry, and contribute to the scholarly community through presentations at regional and national conferences. CUREs are particularly impactful for first- and second-year students, as evidenced by initiatives such as CUREnet (2024) and the SEA-PHAGES project (2024). Even at the scale of a classroom, these experiences empower students to create and present research at end-of-term poster sessions, conference presentations, and publications. Such activities not only provide presentation experience but also foster peer interaction and a sense of community within the course.

CUREs support traditional academic research and learning while supporting workforce development

outcomes (Mekolichick, 2023, Willison 2018) because many of the skills developed for research (quantitative, close reading, writing, presentation, etc.) are valued by graduate schools and sought out by employers in the private sectors

II. Aðferð

The presenter will share examples from various disciplines in the United States, focusing on personal experiences with course development and revision, designing scaffolded assignments, and working with students on research projects. The discussion of the authors' work will outline their plans, goals, setbacks, and adjustments over several iterations of our CUREs. Specific topics will include aligning research projects with course content, structuring the research process through scaffolded assignments and support, creating an interactive environment for final presentations, and fostering student engagement and ownership. Not everything was implemented at once, and there were many revisions and adjustments along the way until the authors settled on structures that worked for their specific courses.

III. Niðurstöður

The key outcomes for students went beyond a completed research project with a presentation of the project at a poster session. Students reported that the project work was more true-to-life. Other students reported needing to draw resources from other courses, awaking new interests in the subject matter, and wrestling with the problem of what their results actually means. Students met the learning outcomes for the course through the scaffolded work and the final project.

IV. Umræður

A key outcome of this work was the need to reassess and adjust student assessment and grading practices. This eventually led to the implementation of specifications grading (Nilson, 2014) which better aligned with the new structure and outcomes. The presentation will cover student responses to the transformed learning environment and revised grading schema (Rivera & Groleau, 2021). Another key outcome was that the faculty workload became more balanced and sane, particularly at the end of the term. One of the goals for adopting this process is to create more room for the many demands on faculty life.

This session will be valuable for faculty interested in integrating research into their courses to enhance student learning, engagement, and career readiness. The presentation also suggests that to get different student outcomes, the same inputs won't yield change. Both authors adopted strategies that were at times counter-intuitive and contrary to their initial beliefs, yet these approaches proved critical to the success of the CUREs.

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