CURQ Vignettes: Additional Examples of Undergraduate Research at the Intersection of Disciplines

Introducing Quantitative Research in First-Year Composition

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Students in my honors first-year composition course, a one-semester class tied to a "Writing and the Arts" learning-living community, devote their major library research project to defining (and justifying their definition) "cultural literacy" in visual art, music, theater, or ballet. From their definitions we construct an 80-question survey testing students' knowledge of basic terminology and history in the four art forms. From the survey data, each student chooses one demographic variable to construct a hypothesis (e.g., that students from private schools will have acquired higher levels of literacy than students from public schools in one or more of those arts). Each student explains the reasoning behind the hypothesis and then applies ANOVA single-factor statistical analysis to test the hypothesis.

Student Research as part of Nanotechnology Education

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Interdisciplinary research requires undergraduates to expand the boundaries of their scientific knowledge. Students in my nanotechnology-education group must understand chemistry but also, depending on the particular research project, mechanical engineering, molecular biology or environmental science. This is typical of research in the chemical industry. Current research projects include forming polymer nanocomposites and measuring their stress-strain relationships and synthesizing nanoparticles and testing their ability to remove pollutants from water or prevent bacteria growth. Since the goal of these projects is to develop a publishable demonstration or laboratory experiment, students must understand the project's technical parameters and be able to discuss what they learned. Undergraduates provide me with reliable advice regarding an experiment's level of difficulty and understand the typical student's pre-existing knowledge and laboratory skills.

An Entry-Level Course: Explorations in Creative and Research Activities

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One member of our teaching team used interviews to identify challenges that entering students face in connecting early in their college careers with faculty and with students who share similar interests. In response, a faculty/staff team developed a novel course that encourages entering students to develop projects focused on areas of deep personal interest. Bimonthly class meetings foster communication skills in a learning community. Class visitors include advanced undergraduates, potential faculty mentors, and academic and student life staff. Students are supported through individual and group meetings as they reach out between classes to mentors and take advantage of resources on campus and beyond. For details, see the course Web site: http://www.usm.maine.edu/~champlin/ECARAHome.htm

Challenges and Solutions to Research Issues at the Interface of Biology and Chemistry at Northern Kentucky University (NKU)

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Kristi Haik, a biologist, and Heather Bullen, a chemist, have been conducting interdisciplinary nanotechnology research over the past four years. Their research is a true collaboration (i.e., equal intellectual and time contributions), prompting NKU to re-examine the reward structure for efforts relating to student mentorship, grant-writing, and research. The authors have also implemented successful tactics to initiate and sustain interdisciplinary projects when budgets are tight. Some approaches include designing projects that can build upon themselves, collaborating across departments to provide supplies or equipment, and tying pilot projects to upper-division classes (which also serves as a recruiting tool for our research labs).

Physics and Archaeology as an Interdisciplinary Endeavor

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Archaeological geophysics uses ground-penetrating radar, conductivity, magnetometry, and resistivity to non-invasively create images of the earth's subsurface. These images directly address anthropological questions as well as guiding archaeological excavation. As a physicist (PhD) and an archaeologist (MAIS), my research involves both physics and archaeology students. I involve physics students in examining the physical and chemical properties creating our geophysical signals, gathering and processing data, and developing more efficient research methods. Archaeology students excavate, process artifacts, and make anthropological interpretations. What makes this type of research especially fun is that student roles are switched where physics students so some excavation and archaeology students conduct geophysical surveys to broaden their experiences while working in interesting geographical and cultural contexts.