

UNIVERSITY of NEW HAMPSHIRE

“Excellence in Outreach Scholarship”

Outreach Scholars Academy

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1. PROJECT TITLE: Reaching Green through Service Learning

2. PROJECT DESCRIPTION

This project would create a partnership with area high school educators, myself, and students in my Organic Chemistry course. UNHM students will work with a partner teacher to design a greener laboratory activity appropriate for a high school chemistry laboratory. UNHM has outreach as part of its mission, especially with respect to the Greater Manchester Community. This project will support that mission. In addition, with the movement of the UNH academic mission to incorporate more discovery based instruction into its general education curriculum, this project would support this need by additionally supporting the addition of a general education inquiry based course in green chemistry (I am developing this course this summer).

3. BACKGROUND INFORMATION/STATEMENT OF THE

ISSUES/PROBLEM: The Greater Manchester community is in need of both formal and informal educational opportunities in the area of sustainability. This project would work in partnership with area high school educators to green the laboratory activities done in high school chemistry labs in the Manchester area and the state of New Hampshire as a whole.

4. PROJECT DETAILS

Goals and Objectives: The goals of this project are to provide area high school educators and their students with greener laboratory activities and training in the principles and practice of green chemistry. Another large goal is to educate UNH students on these practices, and to give them hands on, investigative research

opportunities to attempt to green these activities on their own in the laboratory. This opportunity for original, immediately useful research is hoped to have a positive impact on students in this course and encourage those students to seek out future research opportunities.

Target Population/Audience: This summer, I will be conducting a workshop for NH High School Science Educators, to teach them about the principles and practice of green chemistry and to begin the process of helping them to green an activity. This fall, student teams from my Organic Chemistry (CHEM 545) course would work in small teams with one of the teacher participants from the summer workshop to help them in greening a laboratory activity. Student teams will be required (as part of their course objectives and grade) to devise and implement one or more activities throughout the course of the semester, as well as work actively with the teacher partner.

Evidence of External Collaboration and Partnership: A major practical benefit for the project in general will be the generation of several activities that will be made available for public use. In addition, current participants will benefit by having an increased awareness of the practice of sustainability, and how chemistry can play a role in this increasingly important part of our world. The benefit to UNH from this external collaboration and partnership would be to increase our connection with the Manchester community and area educators as a whole, to provide future opportunities for outreach and community involvement. In addition, it provides immediate benefits to the student participants by increasing their understanding of green chemistry and their ability to communicate scientific information to the general public.

Expected Impact: It is expected that the impact on both the UNH student teams and the high school teachers and their students will be to increase their awareness of the importance of sustainable practice, and to give them a glimpse into the specific role that chemistry can play in that process. I will measure this impact in several ways. First, I will ask both UNH students participating and teacher (and their students) participants to complete pre and post surveys investigating their attitudes towards science, and their

knowledge of green chemistry and sustainable practice. For the UNH students, I will use a nationally known and experimentally validated assessment tool known as the Student Assessment of Learning Gains (SALG, for more information, please see <http://www.wcer.wisc.edu/salgains/fac/SALGains.asp>) in both the pre and post test versions.

Scholarly Connection: Public dissemination of this work will be accomplished via several means. UNH Student teams will contribute their activities, assessment, and feedback as part of a larger wiki that will be maintained on this project. A wiki is a website that can be modified, and all changes can be tracked. This format will allow for a transparent look at all the progress that each student team underwent during the design, implementation, and reflection portions of the project. The wiki will be maintained as a private site until the culmination of the project, at which time it will be made public and announced to the UNH community.

In addition, I will be submitting a publication detailing the results of the project to the Journal of Chemical Education, which has both green chemistry and outreach sections available for submission. I will also be submitting any outstanding original activities to the Greener Educational Materials for Chemists (GEMs) database. This database is peer-reviewed by scientists and faculty trained in Green Chemistry. Third, all teachers will be added to the Greener Chemistry Educators Network (GCHEMEDNET), with a description of their work in the area of green chemistry. This will allow for other people interested in green chemistry to connect with other people with shared interests, thus further extending the green chemistry network. I will present a talk on green chemistry and this project as part of the brown bag luncheon series offered at UNHM and open to the public. Lastly, I will plan present the results of this project at a national American Chemical Society meeting.

This project will greatly benefit my scholarship and professional development. This project is the beginning of a new area of inquiry for me, that being the impact of green chemistry practice and knowledge on student learning and motivation in chemistry. I plan to apply for an Math and Science Partnership (MSP) grant offered by the New Hampshire

Department of Education this coming summer. The larger goal of that project (a multi-year project) will be to create a green chemistry educator network in the state of New Hampshire. Highlights of that project goal would be to have small groups of NH high school and middle school science teachers come to UNHM to learn about the practice of green chemistry (beginning this summer and hope to expand the offering in subsequent years). The larger goal would be to have these teachers then disseminate this knowledge and practice to other teachers, who would come to UNHM for further training and guidance. A larger, career goal of mine would be to serve as a central contact and coordinator for greening the science curriculum at both the secondary and college levels in the state of New Hampshire. Thus, this project will help me to begin along this path and start the necessary process of connecting with the Manchester community and learning more about their specific needs, and how that can connect with my interests, knowledge and skills.

5. EVALUATION PLAN

As mentioned above, the impact on student learning, both from a motivational and knowledge acquisition perspective will be assessed using pre and post surveys. Larger assessment of the scholarship components will be the successful publications and presentations to disseminate this work as noted above. Specifically, publication in the Journal of Chemical Education will demonstrate that I have generated and applied new knowledge that is deemed useful by the chemical education scholarly community. Addition of activities to the GEMs database as described above will demonstrate that we have added practical knowledge and ready to use products that incorporate green chemistry.