

CASTL-SoTL Project Final Report

- I- **Name and Title:** Maria Pacheco, Ph D
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- II- **Project Title:** Creating a Context-Rich Learning Environment in the General Chemistry Laboratory at Buffalo State College

III- **Project Description:** Work started for the project in the fall 2004 and continued during the spring 2005 semesters. The following shows an outline of the steps that were followed in the creation of a context-rich learning environment in the general chemistry laboratory:

a- A literature search was performed in order to find educational settings where the laboratory component of a science majors general chemistry class had been modified to follow a case study or application-based format. Few references were found that showed a total conversion of a general chemistry laboratory course from a traditional to a case study or application based format. Most of the journal articles found presented the modification of specific laboratory activities, or the modification of lab courses for non-science majors or higher-level courses (not the audience we wanted to address). Review of recently published laboratory manuals show two manuals with an open inquiry/discovery-based approach and one with a profession-based approach, i.e. this particular lab would be done if you were a medical lab technician, etc.

b- An informal in-house chemistry attitude survey was created through the modification and/or adaptation of other published attitude surveys. This survey had demographic questions as well as questions regarding students' expectations of the lab activities, their view of the course, etc. The survey was administered to the students at the start and at the end of the semester. In order to have a control group of students, it was decided to split the lecture class according to their laboratory section. That is, one lab section would be exposed to the curricular changes and the other would not and therefore act as a control group. End-of semester as well as individual lab experience grades were collected for all students.

c- The experiments currently used at Buffalo State College for the CHE 112 laboratory course were examined with respect to their context-richness and every-day relevance. Experiments were then modified and/or introduced to the course. Ideas for the modifications were developed through the use of materials found in the literature and through personal interaction with faculty members at other institutions. For some of the experiments in the course, the "traditional" experimental procedures were retained, but the introductions were changed to reflect the context of the procedure in real life. Of particular importance in this aspect of the project is the fact that I received a

fellowship from the Volunteer and Service Learning Center on campus for the introduction of a service learning component in this class. A big portion of the context-rich activities were part of the service learning component of the course. (See Appendix A).

IV- Major Results or findings of your work:

The data from the Service Learning Center and the in-house attitude surveys is currently being analyzed. I am also in the process of comparing the grades both in class and in the lab to see if there is any difference between the groups. From a qualitative perspective, it was clear from students' comments that they enjoyed the service learning activities as well as the new/modified labs.

V- Contributions this project has made or will make to the campus or academic community:

I plan to continue the curricular modifications for the first part of the general chemistry sequence, CHE 111, which I will be teaching this fall semester. I will also be teaching CHE 112 again in the spring 2006 semester. This will give me an opportunity to fine-tune changes and incorporate the suggestions/comments made by students.

I would like to request a date for my campus presentation in November. This will give me a chance to finalize the data analysis and also present the work I will be doing in CHE 111. I propose that my workshop consists of a small group activity where I present the changes made in the course and the impact on students.

VI - Professional Benefits

Through the development of these activities I contacted and networked with faculty members at various institutions in and outside New York State. I also became aware of opportunities for presentation and possible publication of this work.

APPENDIX A

List of curricular changes for the CHE 112 laboratory course.

EXPERIMENT	CHANGE
Determination of Water Hardness	The experiment's introduction was changed to a case study approach. Students were technicians in a water testing facility and had to prepare a water-hardness report for a customer. Students also had to present methods (water filters, water softeners) to deal with a hard water issue.
Determination of the Rate Law for the Crystal Violet Reaction	The experiment's introduction was changed to incorporate information on the pharmaceutical and forensic uses of crystal violet.
Carbonate Content in Eggshells	New experiment, replaced the traditional acid-base titration. Students determined the percentage carbonate in the shells of eggs they brought in. The introduction presented the environmental factors affecting the carbonate content (and hardness) of eggshells.
Qualitative Analysis	New experiment, replaced qualitative ion analysis. Students were presented with a scenario involving the identification of substances suspected to be drugs found at a high-school locker raid.
Soil Analysis	New experiment, this was the service learning component of the class. Students visited the Massachusetts Avenue Project site, where they took soil samples from the agency's gardens. The students then tested the soil for nutrient content as well as physical properties.