Engaged Environmental General Education for Accelerated Student Success

A Joint Proposal for a General Education Pilot Program between
East Los Angeles College (ELAC) and
California State University, Los Angeles (CSULA)

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Abstract:
East Los Angeles College - Cal State Los Angeles General Education Pilot
This Science-Technology-Engineering-Math ("STEM")-focused pilot embeds intellectual skills like writing and quantitative literacy into coursework in chemistry. Through practice students will learn the central role of written communication and statistical analysis in scientific research. Community engagement and the theme of environmental sustainability will demonstrate the real-world consequences of such learning. In turn, linked courses in math and English will build fundamental skills and incorporate this theme. The pilot will take advantage of existing efforts to streamline and accelerate remediation, further improving STEM success for underserved populations.

What do we want to do?
The Context: ELAC is a two-year community college that awards Associate Degrees and prepares students for transfer to four-year universities. CSULA is a four-year comprehensive university offering Bachelor and Master degrees. We both serve the culturally diverse communities of the Los Angeles basin, with student populations comprised primarily of first generation college students and traditionally underrepresented groups. Many students from ELAC go on to study at CSULA. Despite our close proximity and closely related missions, however, there is very little contact and collaboration between the faculty of the two campuses. The articulation process—whereby the courses at ELAC transfer to CSULA—is generally impersonal and conducted through staff intermediaries. The general education offerings at the campuses are compartmentalized "cafeteria style" courses: there is nothing in the structure of general education that helps students integrate knowledge across courses and comprehend the "why" of general education. To address this fragmented approach to learning, herein we propose a pilot for a one term integrated learning community (iLC) consisting of Math, English, Chemistry, and seminar courses.
The Purpose:

- **Institutional:** This pilot will bring together faculty from at least three disciplines at ELAC and CSULA in a way that will allow them to discuss general education courses with a focus on outcomes and integration of knowledge. While the pilot will begin with existing courses safely within the bounds of the current general education model, the assessment process will evaluate the degree to which outcomes from other areas of the current general education model—such as critical thinking and lifelong learning—are being met in the linked courses. The process will also allow for the faculty from different disciplines to train each other how to deliver their classes in a manner more suitable for interdisciplinary collaboration. It will also provide a model for how we can engage in substantive cross-campus collaboration that improves the quality and alignment of our general education programs.

An advantage to the approach taken in this pilot program is that it could easily be expanded to include more feeder schools, and it may be implemented at other CSU’s. This is because the component courses (math, chemistry, composition) already exist at these institutions. The unique thematic linkage may be duplicated with the addition of a 1 unit seminar. The theme does not have to be environmental in nature. The interests of natural/physical science faculty may be reflected in alternate themes. For example, health/pharmaceutical/biomedical themes would also be suitable for linked science, statistics, and writing components.

- **Pedagogical:** A great deal of attention is being paid to remediation at both campuses: over 80% of students on both campuses require remediation, so this is an important priority for our campuses to address. This cohort will focus on students who desire to accelerate through their remediation and "college level" general education courses while providing a framework for increasing time-on-task activities. Our hope is that some of our underserved students will become excited about science and choose a major in a STEM field. By cohorting a group of students at the beginning of their general education coursework, we expect to improve student success rates (e.g., GPA, retention, and persistence to degree) through helping students to understand the "why" of general education. By creating a linked set of classes with an integrative seminar, students will ideally begin to see their "cafeteria-style" general education requirements as necessary parts of their educational experience and become self-directed learners.

- **Thinking Outside the GE Boxes:** Evidence such as common assignments, videos of presentations archived in the ePortfolio, and survey data will allow faculty from both campuses to begin the discussion on whether these linked courses meet outcomes for general education areas beyond the content areas of the courses.

Details of the Pilot:

- The pilot will utilize several High Impact Practices: learning communities; community engagement; integrative seminars; developmental/remedial workshops coordinated with courses; reflective practices using e-portfolios; and an emphasis on using statistics as a vehicle for meeting the outcomes for quantitative reasoning.
- The pilot will include departmental faculty members and members of institutional research from both campuses to study student success during the course of the pilot. On both campuses, we will create a learning community of 25 students who take linked
general education classes in English, Chemistry, and Math along with an integrative seminar. This cohort will work with other remediation projects in an attempt to improve and accelerate student time to degree.

- The linked classes will focus on environmental issues and include a community engagement component. The math and English classes and the integrated seminar will help students to engage critically with and apply the knowledge and skills learned in the chemistry course (see graphic below).

![Diagram showing the overlapping circles of Chemistry, Seminar, English, and Math]

- **The Chemistry lecture** will teach students to look at the world as a chemist through a molecular lens. The lectures will focus on disciplinary perspectives and methodologies to help students connect what they are doing in chemistry to what they are studying in their English and math classes. The Chemistry lab will be devoted to investigating environmental issues of importance to the community. Both the lecture and lab will employ statistical methods learned in the math class and emphasize the importance of writing in the natural sciences.

- **The English course** will be the first college-level composition course required in general education (IGETC 1A). Students needing remediation in English will take a linked writing lab or be accommodated through an accelerated approach to remediation. The English course will focus on critical approaches to science and the environment. This will help students understand what science is, how it works, and how to engage critically with scientific arguments through writing.

- **The Math class** will emphasize problem-based statistics in a manner consistent with the Carnegie-funded Statistics Pathway strategies and methodologies. Students needing remediation in math will take a math workshop. The problems for this class will focus on environmental issues relevant to the experimental work that they are doing in the chemistry lab. One major goal of the course is to empower students with the tools necessary to become better-informed consumers and citizens through helping them understand how data gets presented in the public realm.

- **ePortfolios.** Students will use ePortfolios to revise and present their work in each class, as well as to write self-reflection pieces on their experiences in the cohort.

- **The Integrative seminar’s outcomes** are to develop team-work and to have students articulate and utilize the relevance of the content material from the other classes. Students
from both campuses will be in the same seminar section where they will work in teams synthesizing material from the three content area classes on an environmentally themed culminating project. The meetings for the seminar will alternate between campuses, and will include speakers from many different areas of expertise (e.g., public policy makers, health experts, corporate representatives, ethical philosophers, etc.). The seminar will conclude with oral presentations utilizing the "showcase" portion of student ePortfolios that will require integration of knowledge, self-reflexive analysis, and identification of outcomes by the students.

To promote student success, instructors would use early diagnostic methods to determine if students are falling behind. A minimum of 1 weekly quiz/assignment is evaluated to identify if the student needs supplemental instruction in the workshops that parallel the offerings. This would increase retention, an important criterion of short-term success. If a student must drop one of the courses, they may remain in the others, but they must also drop the 1 unit seminar.

If the unit load from combining three courses impacts enrollment, options such as linking two courses that still incorporate many of the high impact practices will be pursued. It might be productive in that case to compare student achievement in combinations such as Science + Math versus Science + Comp. Assessment of the pairings would allow one determination of the effectiveness of these different combinations in achievement of student learning of the different outcomes.

The target audience for the iLCs are students that are prepared for college ready English and mathematics and those who test into the highest level of developmental English and mathematics. Since this course will be first offered in the spring quarter at CSULA, a rich opportunity exists to tap into current learning communities at CSULA to recruit students into the iLC as they will have experienced the benefits of being in a learning community. The timing corresponds with the second term at ELAC so recruitment can also occur in developmental classes there: as “Early Start (CSU mandated remediation)” programs become established, these programs may provide good recruitment. We also plan to hold focus groups to determine what times and other incentives (priority registration, for example) will make the iLCs more attractive.

**Learning Outcomes:**

- These linked courses will address learning outcomes traditionally associated with general education English, quantitative reasoning, and natural science. However, the learning will extend beyond these boundaries to address more general outcomes, including the following "Essential Learning Outcomes" from the LEAP initiative:
  - Knowledge of human cultures and the physical and natural world through study in science, mathematics, and the humanities. This will be focused by engagement with "big questions" related to environmental issues.
  - Intellectual and practical skills, including inquiry and analysis, critical thinking, written and oral communication, quantitative literacy, information literacy, teamwork, and problem solving.
  - Personal and social responsibility, including civic knowledge and engagement, ethical reasoning, and foundations and skills for lifelong learning
anchored through active involvement with the diverse communities of the Los Angeles basin.

- Integrative learning, including synthesis across specialized studies, demonstrated through the application of knowledge, skills, and responsibilities to complex problems related to environmental issues in the local communities.

**Sample Projects to engage students in the iLC**

**Pesticides.**
California leads the country in pesticide use, and environmental justice concerns are particularly important here. Low-income communities and communities of color suffer the greatest risks and impact of pesticide use. One community project can involve testing water samples for pesticides. Equipment at both ELAC and CSULA can be used to quantify pesticides in the samples. In addition to collecting and analyzing samples based on published procedures (“Pesticides in Drinking Water: Project-Based Learning Within the Introductory Chemistry Curriculum” O’Hara, P. B.; Sanborn, J. A. *J. Chem. Ed.*, 1999, 76, 1673-1677.), students will learn to examine the chemical structures of several pesticides and predict how each compound will be distributed within the environment (water, soil, sediment, biota, etc) based on the polarity of the compound. Additional laboratory experiments will determine water/octanol partition coefficients of each pesticide, which may be used to quantify the polarity. Students’ predictions may be validated through the use of online computer models of the environment. (“Intermolecular Forces as Key to Understanding the Environmental Fate of Organic Xenobiotics” Casey, R. E.; Pittman, F. A. *J. Chem Ed.*, 2005, 82, 260-264.).

**Water quality.**
Globally water quality has become a concern because clean water is essential for good health. In southern California 90% of its drinking water comes from ground water, thus making water quality an important issue. This community project will consist of testing water quality of local water samples of rivers and lakes in their neighborhoods and local recreation areas. by methods described in (“Characterizing Water Quality in Students’ Own Community: An Effective Campus Field Trip” Lunsford, S. K.; Speelman, N.; and Yeary, A.; *J. Chem. Ed.*, 2007, 84, (6) 1028-1030). Students will be trained in proper sampling methodology, field and lab measurements. Water quality will be analyzed by measurement of temperature, pH, % dissolved oxygen, conductivity, turbidity, nitrate concentration, phosphate concentration and coliform bacteria. Students will gain experience in determining water quality, and then predicting possibilities for explaining what potential pollutant sources exist. Additional lab studies can look at water quality after purification treatment, and extend measurement to measuring the environmentally significant metals including cadmium, copper, lead and zinc.

**Lead in paint**
Local cities have old buildings/homes which have not yet been lead – abated. In Los Angeles County, most homes were built when paint contained lead. A published service-learning project may be adapted for the iLC. (Kesner, L.; Eyring, E. M. “Service-Learning General Chemistry: Lead Paint Analyses.” *J. Chem. Ed.* 1999, 76, 920-923). In this project, the scope of a possible lead-based paint problem in one or more older neighborhoods may be assessed, and the public may be educated about the hazards and possible abatement alternatives for lead paint. Samples would be obtained and processed by students during the laboratory class. The samples from students at both campuses would be analyzed by a technician at CSULA using instrumentation housed there. Statistical analysis of the data will be used to determine the significance of the
data, and any correlations with geographic or socioeconomic variables, reinforcing concepts learned in the math course. The results of the analysis of paint samples in the neighborhoods would be presented to an appropriate agency (housing or health officials), to members of the community, and possibly to local newspapers in written form, reinforcing skills learned in the English composition course. The seminar would expose students to a variety of perspectives on hazards such as lead paint, including public health, building and safety, environmental justice, and laws/loopholes/policies.

**Community Engagement/Service Learning Infrastructure.**
Community engagement/service learning has strong support at CSULA with a Director of Community Engagement ([http://www.calstatela.edu/centers/sl/](http://www.calstatela.edu/centers/sl/)). The CSU system is also a strong proponent of community engagement/service learning ([http://www.calstate.edu/cce/initiatives/infra_development.shtml](http://www.calstate.edu/cce/initiatives/infra_development.shtml)) and provides an annual allocation to CSU campuses (interestingly from a separate line item in the state budget). EPIC (Educational Participation in Communities, [http://www.calstatela.edu/univ/stuaffrs/epic/](http://www.calstatela.edu/univ/stuaffrs/epic/)) assists with placement and support with community projects. EPIC has a long history of providing opportunities to students for community service and was founded in 1966. Two chemistry faculty from CSULA (Tikkanen, McCurdy) have applied as part of a team to the “The Engaged Department – Institute for the Sciences” sponsored by the CSU Center for Community Engagement. This and/or other faculty development workshops will help develop the expertise and interest in chemistry-based community engagement activities.

**Indicators of Success: Evaluation.**
- Increased retention rates in iLCs compared to the standalone component courses
- Improved student achievement in iLCs compared to standalones for both the course SLO(s) and GE outcome(s) (Natural Sciences area, Quantitative reasoning, Composition)
- Evidence that “other” GE outcomes are being met in these courses. They include Critical thinking, Life long learning, LEAP outcomes.

Longer term goals include:
- Increased student persistence, and improved performance in subsequent courses
- Improved student success for ELAC transfer
- Established an e-Portfolio library that provides examples of student achievement.
- Demonstrated achievement of the “other” GE outcomes
- Acceptance of outcomes achievement for GE area “credit”
- Scale up at parent campuses
- Dissemination to and adoption at other CCs (Los Angeles City College and Pasadena City College, for example).

**How do we envision the pilot program as being sustainable and more broadly implemented?**
- We will develop regular retreats that will involve faculty from our two campuses in regular conversations about general education outcomes achievement and major preparation.
- Improved retention and success rates may convince administrators to invest in learning community classes for general education that have smaller class sizes relative to non-learning community classes. One metric of interest for stakeholders funding education would be the cost for a student to achieve a given set of outcomes in the iLCs compared
to the traditional route, including the high attrition observed in some of these classes.

- We will work to expand the pilot to include other natural science classes (e.g., biology and geology).
- Another goal is to adapt and expand this model to engage STEM majors in a more efficient and effective group of general education courses that will integrate their foundational science training within an interdisciplinary general education framework. Given the pressure of STEM majors to compress their general education training, this model could help solve a persistent and pressing problem confronting STEM majors on the two campuses.
- Because the courses that compose the iLCs already exist in one form or another at CSU and community college campuses (with the possible exception of the workshops/supplemental instruction sections at community colleges), such iLCs could also be constructed at those campuses. The intercampus seminars between the community college and the CSU will be evaluated to see determine if the benefits are worth the resources to implement them.

What long-term changes in policy does this have the potential to catalyze?

- This project will provide a critical mass to help rethink the remediation and general education courses for Math on both campuses. This same kind of accelerated remediation will also be explored in relation to "stretch" and accelerated models of remedial composition being developed on campuses across the state.
- Gathering long-term data about the achievement of outcomes for general education that go beyond the boxes that currently circumscribe the linked courses. If we can demonstrate that outcomes such as critical thinking and lifelong learning are being met in these courses, we can begin to uncouple the artificial link between seat time and the attainment of general education goals. Instead, we could begin to show our campuses how we can remodel our general education programs and use authentic achievement through data in ePortfolios as a measure of completing general education requirements.
- Another goal is to push our campuses further down the road of reimagining what we consider as our general education outcomes to reflect our commitment to the "Essential Learning Outcomes" articulated by the LEAP initiative.

Issues:

- Overcome the logistical issues (such as parking, registration, scheduling, etc.) associated with the integrative seminar.
- Determine how to flag the linked classes with an "L" designation that will allow for long-term studies of student success.
- Develop catalog copy that helps explain this all to students. For example, come up with concise copy that will help students understand how the English class will engage science and the environment.
- Develop an English writing lab at ELAC for the purposes of this pilot program.
- Academic Calendar Issues. Since at this time, ELAC is on a semester calendar and CSULA is on a quarter calendar it will require some discontinuity between the iLCs. To address the issue, we, the team, recognize that the starting times for the two cohorts will
be different, with ELAC’s semester beginning approximately a month before Cal State’s quarter. Ideally, we would like to begin at the same time, but what is more important is that both cohorts will conclude their course work and complete the capstone project at the same time. Initial collaboration between the two cohorts may not occur immediately, but we anticipate that toward the final weeks of the semester/quarter, there will be opportunities for focused, collaborative efforts.

Who do we need to persuade?

- Departmental faculty and chairs on both campuses in Math, Chemistry, and English.
- ELAC: Vice Presidents for Academic Affairs.
- CSULA: Dean of Undergraduate Studies, Dean of Arts and Letters, and Dean of Natural and Social Sciences.
- Students. One appeal to ELAC students is that this will give them a leg up on transfer to CSULA. For CSULA students, we will provide priority registration; it will also appeal to CSULA students by providing an expedited path through what is for many students an unattractive part of general education.

Timeline: (shaded rows indicate offering of the iLC pilots)

**Year 1.**

<table>
<thead>
<tr>
<th>Summer 2011</th>
<th>Developing curriculum for integrated learning communities (iLCs) , scheduling of the iLCs, training faculty in Moodle, meeting to align expectations in courses, develop draft syllabi, attend GE institute, run student focus groups, develop 1 unit remediation at ELAC comparable to CSULA ENGL 100</th>
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<tbody>
<tr>
<td>Fall 2011</td>
<td>training faculty in Moodle, develop draft rubrics, work with advisement personnel, EOP, etc. to identify and recruit students for the iLC’s, identify and arrange for seminar speakers</td>
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<tr>
<td>Winter Spring 2012</td>
<td>launch PILOT: one iLC per campus</td>
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**Year 2.**

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<tr>
<th>Summer 2012</th>
<th>Begin evaluation of portfolios</th>
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<tr>
<td>Fall 2012</td>
<td>Continue evaluation to identify areas for improvement. In addition, review for achievement of outcomes beyond those traditionally associated with the classes</td>
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<tr>
<td>Winter Spring 2013</td>
<td>Second Pilot Offering- potential to scale up number of sections (one larger chem. Lecture; labs are identified with individual learning communities)</td>
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### Year 3.

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<tr>
<th>Summer 2013</th>
<th>Evaluate and disseminate if valid, develop proposal for certification of iLCs for other GE outcomes – propose models for LACC and PCC. Develop policies/procedures to facilitate these iLCs on each campus</th>
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<tr>
<td>Fall 2013</td>
<td>Third offering- potential to scale up number of sections (one larger chem. Lecture; labs are identified with individual learning communities)- submit GE certification proposal if evidence is convincing</td>
</tr>
<tr>
<td>Winter, spring 2014</td>
<td>Fourth offering- potential to scale up number of sections (one larger chem. Lecture; labs are identified with individual learning communities)- submit GE certification proposal if evidence is convincing.</td>
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