ComGen: The Community College Genomics Research Initiative
The Mini-Graduate School Experience

Mahalaxmi (Gita) Bangera
Bellevue Community College, WA

Project #: 0717470
Type: Phase II—Expansion
Target Discipline: Biological Sciences
Focus: Creating Learning Materials and
Teaching Strategies

Our goal is to remove any real or perceived barriers between community college students and rewarding careers in scientific research.

We provide a mini-graduate school experience, helping students make the transition from passive learner to engaged, creative participant in the scientific community.

Students gain hands-on research experience on real-life scientific problems.

They learn the latest techniques in genomic technology, and meet with world-class research scientists.

We record and evaluate our successes, noting where improvements may be made, leading to modular curriculum units that can be used at community colleges nationwide.

Our teaching has already lead to improvements of facilities at BCC including...

ComGen student volunteer at the
Skwant Summer Science camp.

Dr. Bangera (PI) with Drs. Weller and Lovrich
at the Faculty Serving Washington Event.

Journal club/Seminar
At first, students find it difficult to understand a scientific journal article well enough to teach it to the class. As they work through their initial difficulty their comfort with scientific nomenclature increases and they are rewarded by new perceptions of themselves as skilled learners.

Early student assessment and assistance
Preparatory education is provided to bring some students up to the required starting level.

Diagram and explain
Students are assigned diagrams the night before the class, then collaborate in groups to produce a single diagram. This leads to better understanding of the material. Students are expected to connect lab protocols and theory.

Guest Speakers
An essential part of our program, meeting with working scientists allows students to see the person behind the laboratory report.

We hosted Dr. Weller (Research Leader, Root Disease and Biological Control Unit, USDA-ARS) on the impact of this student research, and Ms. Stephanie Tatem Murphy (Geospiza Corporation) on bioinformatics in Spring 2008.

> *Class discussions lead to better understanding than assigned class readings*

Laboratory experience
Videos and animations provide especially effective introductions
Students analyzed any mistakes, then repeated their experiments
Students learn from producing their own lab solutions (and reduces costs)
We found that students are more involved when adequate supplies minimize waiting times

The Seattle Times Company

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Grant puts BCC students on the trail of a crop killer
By Meghan Peters
Seattle Times Eastside bureau

Bellevue Community College students will get a taste of solving a crop killer, "CSI" style.

The criminal: a fungus that attacks plant roots — particularly wheat and barley — and can devastate an entire field with a disease called Take-All.

Although few at the community-college level have the opportunity to engage in genetic-research projects, a $478,000 National Science Foundation (NSF) grant awarded to BCC will allow students to do hands-on DNA sequencing.

By using this method, which is also used by the hit TV show's crime-solving forensic scientists, students will analyze genes of a specific bacterium, which is not being studied by other researchers.

Because the organism has shown potential for protecting crops from the fungus, students will attempt to find how it benefits plants.

With competition from four-year universities and independent research labs, grants awarded to two-year schools are rare, said Gita Bangera, the project's director and BCC Life Science instructor.

> *"Most teachers say they will use the Socratic Method, but they don't. You stayed with it throughout the class and that was great."*
> -Student B.

Regional Outreach
Contributors to WA state research "Pumping-Up the Math and Science Pipeline: Grade School to College", including Native American students at Skwant Summer Science Camp, monthly science instruction in Colville Reservation schools, and summer science internships for Colville Reservation students.
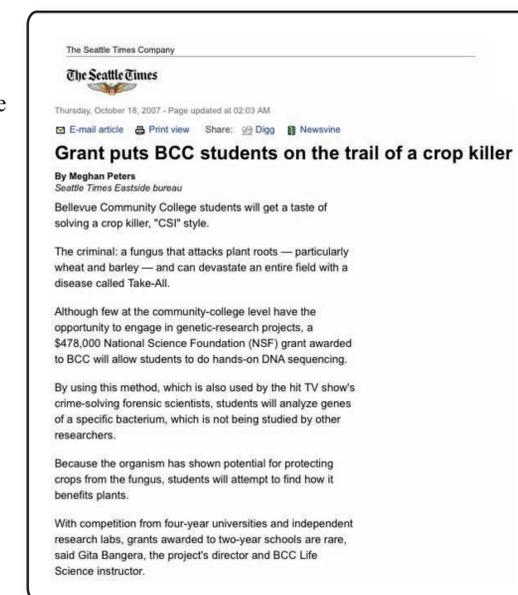

PI with BCC Foundation Board Members.
WA State Attorney General Rob McKenna
and Mike Humphries BCC Foundation
President are to the right of Dr. Bangera.

Course Assessment
A course portfolio includes sections for each week with class overviews, handouts, and ideas for next iteration of class.

An end-of-course assessment focus group collects student views on the impact of this course on their sense of themselves as **scientists** and **learners**.

> *Students spoke of suddenly being able to understand specialized vocabulary of guest speakers -- something that makes them feel like members of the community of scientists.*

Student Assessment
Take home exams
Drawings to demonstrate understanding:
  how to generate a genomic library
  sequencing a genome
  pyrosequencing methods
 Protocol & procedure analyses
Oral exams

References
Handelsman, J., Miller, S., and Pfund, C. 2006. Scientific Teaching. W.H. Freeman & Company.

Web site http://scidiv.bcc.ctc.edu/Comgen