

Biology SAC

Portland Community College

Program/Discipline Review Spring 2011

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Introduction

The Biology SAC is a community of 17 full-time instructors and approximately 76 adjunct faculty dedicated to the discipline of the biological sciences with instruction at Rock Creek, Cascade, Sylvania and Southeast Center campuses. Although differences exist with regard to facilities, support, and course offerings among campuses, the SAC is united in commitment to supporting PCC students in academic growth and preparing them for their future as continuing learners, professionals and citizens. A sound, critical understanding of the properties of the living world is valuable in supporting the college core outcomes and also supports knowledge in other disciplines such as anthropology, sociology, chemistry, and environmental science.

Program Goals

The overall educational goal of the biology department at Portland Community College is to provide students with a critical introduction to the scientific method and strong grounding in basic content areas, while also seeking to achieve the institution's core outcomes. We offer courses that prepare non-majors to think critically about the role of science in our society, develop an appreciation for the scientific method and an understanding of the complexity of living organisms. We also offer courses for majors preparing for advanced work in the biological sciences by offering courses that ground them in the principles of the scientific method. Course work can be used to earn an associate degree and/or fulfill transfer requirements. The biology department also has a strong mission to serve students preparing to apply to programs in the allied health sciences such as nursing, dental hygiene, veterinary technology and radiography. We also serve other programs such as Environmental Science Studies. This has historically been the educational objective of the Biology Department. Strong growth in enrollment since the last program review, particularly in the pre-requisite courses for allied health sciences, suggests that the mission of the department will not change in the next five years.

The Discipline within PCC

The Biology SAC addresses the outcomes of the college by offering diverse biology courses that can be applied to a PCC Associate's Degree as well as used for credits that transfer to other college and university programs. The Biology Department offers a wide variety of interesting and engaging courses taught inside the classroom and in the field. We enable students to meet a general science requirement, major in biology, and to take pre-requisite courses for environmental science and allied health programs such as nursing, physician's assistant, radiology, dental hygiene, physical therapy, geriatrics, and chiropractic care. Several courses include a distance option for those who prefer taking a class online. Associated labs and field trips provide hands-on learning experiences. Our faculty members have advanced degrees with specializations in many related fields including Ecology, Botany, Microbiology, Medicine,

Zoology, Entomology, Vertebrate Physiology, and Science Teaching and are committed to sharing with their students their passion for the study of life.

The Biology SAC strives for quality education through screening of potential lecture and laboratory teaching faculty as well as teaching observations conducted by our department chairs and deans. Course materials and on-line resources are reviewed frequently by instructors to ensure they are up to date on the latest scientific findings and research. Furthermore, students are engaged actively inside and outside of the classroom with application-based learning, enhanced by the use of case studies. Learning outside of the classroom includes several service learning opportunities. This includes student community services for organizations such as involvement in the PCC Habitat Team, PCC rain garden, PCC Rock Creek Environmental Studies Center, Rock Creek Learning Garden, Animal Aid, Meals on Wheels, the Department of Fish and Wildlife, The Portland Audubon Society, Eagle Creek Fish Hatchery, Red Cross, OHSU, and several federal, state, and local agencies. Some anatomy and physiology students have the option to visit the cadaver lab at other institutions. The Biology SAC also emphasizes sustainability in many aspects of the curriculum and is committed to the goal of Portland Community College to move toward being an example for the greater community in the teaching and application of environmentally sustainable practices. This ensures quality of education and learning experiences that help students to achieve their personal and professional goals.

Our biology departments offer services and support beyond the classroom. Full-time instructors offer a minimum of five hours per week of office meeting time with students for help with coursework and with advising. Faculty members also engage students by encouraging them to form study groups and to use tutoring services. Open-lab times are held on a limited basis between classes.

The Curriculum

The Biology curriculum for most of our courses is grounded in professional program guidelines.

Anatomy and Physiology

During spring term 2009, BI 231/232/233 curricula were compared with the Learning Outcomes of the Human Anatomy and Physiology Society (HAPS). The HAPS learning outcomes are designed for a year-long Anatomy and Physiology series at the undergraduate level. Our curricula are in-line with the learning outcomes of HAPS.

Microbiology

Our microbiology classes (BI 234) are in-line with the learning outcomes of the American Society for Microbiology (ASM) for undergraduate study of microbiology. The primary themes and concepts, as set forth by ASM, are designed for students to demonstrate knowledge and understanding of cell biology, microbial genetics, interactions and impact of microorganisms and humans, interactions and impact of microorganisms in the environment, and the integration of

evolution and diversity in microbes. The laboratory themes and concepts are designed for students to successfully perform light microscopy, prepare slides, use aseptic technique, use biological media and test systems, enumerate microbial populations, and the correct use of equipment and safety in the microbiology laboratory. In addition, the course gives students an opportunity to increase their skill level with respect to critical thinking, analysis, communication and interpersonal interaction.

Cell Biology

BI 112 was created following a state-wide effort to better prepare students for BI 231-233 and BI 234. Our BI 112 curriculum closely matches similar courses at Mt. Hood Community College, Lane Community College, and Linn-Benton Community College. A series of state-wide meetings between 2002 and 2004 fostered consistency between these institutions. This was new initiative for PCC.

Principles of Biology (for Biology majors)

For the majors biology classes (BI 211, BI 212, and BI 213), Portland State University, Oregon State University, and several community colleges have communicated since the last program review to compare curricula over the course of the year. We recognize that the courses are basically equivalent and articulated, and to maintain consistency we plan to continue these working relationships. Members of our faculty attend meetings such as NWBIO, which include sessions dedicated to instructors of specific courses (anatomy and physiology, microbiology, biology majors, and non-majors) getting together to discuss issues, textbooks, syllabi, and articulation amongst the Oregon and Washington community colleges and universities. Other meetings, such as CCUP (Community College and University Partnership) at the University of Washington, also provide a time for Oregon and Washington community college and university biology instructors to discuss issues common to all of our courses.

Changes to course content

All Course Content Outcome Guidelines were updated twice since our last program review to meet the new guidelines for college outcomes. Most courses did not experience major alterations in this process, but there have been some enhancements. Service-learning has been added to BI 101, BI 142, BI 163 and BI 211-212-213. The most significant change in course content since our last review stems from the development of BI 112, Cell Biology for allied health majors. This course was developed in response to the need for better student preparation for BI 231-233 and BI 234. This course has replaced BI 101 as the pre-requisite course for BI 231 and BI 234. In the 2008-2009 academic year there were 96 BI 112 sections offered.

Development of BI 112 allowed us to revise our curricula for General Biology, BI 101-102-103, as true non-major classes. As part of this effort, since our last program review we have rewritten each of the lab manuals for these courses. Lab activities now support content learned in lecture

regarding the applicability of biology to our personal lives. Reflective exercises are incorporated into lab activities that support the student in the practice of critical thinking. These lab manuals are also less expensive for students to purchase than those previously provided by publishers. Curriculum development (IIP) grant funds were used to support the development of BI 112 and the revision of BI 101, 102, and 103 labs.

A major shift in emphasis in many courses is to engage students in the primary literature as a way to teach the process of science, and science communication. Efforts to engage students in primary literature include specific assignments in BI 112, 198, 202, 211, 212, 213, 231, 232, 233, 234 and 298. Formal research papers written by the students on lab experiments are required for BI 211-212-213 and BI 112. Literature reviews are part of this process, giving students exposure to primary literature and practice in accessing science. For example, in BI 212, a new assignment prepares students to write a formal research paper which increases the intellectual depth of the introduction. Students are given a peer-reviewed primary research article with the original introduction redacted (copyright permission was arranged with the journal to do this). Primary sources cited in the original introduction are made available. Students are asked to use these materials to write an introduction to the paper. At the end of the assignment, students are given access to the original introduction so they can compare and further evaluate their work. In many sections of BI 231, 232, and 233, students are also expected to conduct literature reviews. This requires students to obtain relevant, current, peer-reviewed articles. Students provide a summary of an article, critique its quality, and reflect upon what they have learned from the article. These are only two examples of how students are engaging the primary literature.

In addition to changes in current courses, six new courses have been developed or reactivated in response to student need and to the college mission.

To support PCC's new honors program, BI 101H was developed and taught Fall 2010 at Sylvania Campus and Spring 2011 at Cascade Campus. The course outcomes reflect the honors program goal of self-efficacy and greater rigor, as well as additional outcomes specific to the discipline that are attainable for students arriving prepared for rigorous study. Enrollment for the first offering at Sylvania campus was small (14 students) but we hope that enrollment in future sections will be greater as interest in the honors program grows.

BI 163: Organic Gardening was reactivated to support our college outcome of community and environmental responsibility, and in response to community interest. It has been offered each spring since 2004.

BI 145: Introduction to Fish and Wildlife Conservation and Management was added for students to fulfill one of the coursework requirements for professional wildlife biologists who want to eventually become certified. The national professional organization of wildlife practitioners, The Wildlife Society, has a certification program that requires coursework specifically in

Wildlife biology is required. This course was closely designed to resemble similar courses at University of California at Davis and Oregon State University.

BI 198 and 298: Independent Study courses were each added to allow for deeper investigations by independent study students.

BI 287: Introduction to Immunology is a new 4-credit course established by adjunct instructor Dr. Zahra Mehdizadehkashi and full-time instructor Kathleen Richardson. Students had asked for an immunology course that would fulfill a prerequisite for the Medical Technology program at Oregon Health Sciences University. This course was an entirely new course to the Oregon college curriculum and required approval at the state level. Based on research of immunology courses taught throughout the United States, we are currently the only college to offer a 4-credit, 200-level immunology course.

BI 95: Introduction to Science and Language Concepts is currently being developed to better prepare academically underprepared students and those whose English skills are not strong enough for success in upper level biology courses. BI 95 will introduce science language and basic concepts of biology for students who are interested in entering into biology or the allied health programs. The course is intended to focus on improving an understanding of science language and terminology and introduce the scientific method. The course is also intended to help students learn how to critically read about and study science.

Two courses have been retired. BI 170: Race to Save the Planet was inactivated when the college stopped offering telecourses. BI 237 Applied Microbiology was inactivated due to evolving program needs.

Assessment of course outcomes

A variety of tools are used to assess how well students are achieving course outcomes. Exams, laboratory practical exams, lab write-ups, research papers, reflective journals on service learning, case studies, and group projects contribute to our assessment of students. Most of our courses use laboratory work, case studies, and/or literature reviews to assess the skills outcomes of collaborative work, communication, problem-solving and critical evaluation. All CCOGs provide assessment tools for measuring the course outcomes.

Several instructors of BI 231-233 Human Anatomy and Physiology at Cascade campus have used the comprehensive exam made available by HAPS (Human Anatomy and Physiology Society), to assess student learning compared to other institutions teaching a year-long anatomy and physiology course. While the national average score on exams for students from two-year colleges is 52% and 54% at four-year colleges, the average for Cascade campus students was 70%.

Since our last program review, we have continued to track student performance, identifying areas that need improvement regarding outcomes. Modifications have been made to many laboratory and classroom activities to better help students where performance has been weak. For example, in Biology 101, students were not effectively meeting an outcome regarding an understanding of how biological macromolecules are formed from smaller units. In 2007 we designed a hands-on activity in lab where students simulate the process. Scores on the assessment of this topic have improved.

Assessment-driven changes have also been made in BI 142 Habitats: Marine Biology to achieve course level outcomes and demonstrate process skills. A lab manual containing eight in-class labs and one field-based lab was written for the course that includes exercises that help students characterize the marine habitat using the scientific method. Students are introduced to the study of seawater and investigate the relationship of salinity and density. Three different methods of measuring salinity are compared. Students are introduced to the use of a taxonomic key in lab 2 and are expected to identify specimens to different taxonomic levels in six subsequent labs. Students are introduced to dissection in three different labs. The newly written lab manual guides students as they identify and begin to develop an understanding of the biology of various marine phyla. The lab manual is a platform for weekly lab write-ups that are turned in for assessment. These weekly assignments include drawings, data tables and graphs, and review questions.

The microbiology instructors at the Sylvania campus have written a lab manual specific for the class. This has significantly reduced student textbook costs and also increased performance in the laboratory by about 10% in all sections.

Some instructors are using case studies in both BI 101 and BI 112 to give students the experience of learning from an assignment. The students are given five case study assignments on the first day of class. The case studies are due on the last day of class. The students are encouraged to turn the case studies in before the due date for critique by the instructor. They then turn in revised case studies. In this way students have an opportunity to learn by revision, something that often happens in the workplace.

Another example of assessment driven change is the new scientific paper assignment for BI 112 Lab at the Sylvania campus. Originally, students wrote two scientific papers, each describing a different scientific experiment the student had conducted in lab. The lab manual contains three appendices which very specifically instruct students in the mechanics of writing a scientific paper, producing appropriate tables and graphs and the use of peer-reviewed sources. It was assumed that the quality of the students work on the second paper would improve as a result of feedback from the instructor on the first paper. This clearly did not occur, suggesting that a different approach was needed. A different assignment was created and tried for four or five terms. Instead of two different papers, students were to write one paper which was graded and returned. Students were then to improve and make corrections to their paper and turn it in a

second time to be graded again. Yet again, the quality of student submissions was quite poor. The assignment was modified again. The newest assignment involves small homework assignments, each of which focuses on one aspect of a scientific paper. The students get practice and feedback on components of scientific writing which they can then apply to the paper they will write at the end of the term. This form of assessment has been in practice for one year and the majority of instructors have seen a marked improvement in their students' understanding of how biologists communicate the results of their research to their peers and to the larger public.

We currently do not have a mechanism to measure the success of our students who have departed PCC. Such an instrument would be important to evaluate the effectiveness of our courses in preparing students for meeting the course outcomes.

Addressing College Core outcomes

Assessing our courses for how they address core outcomes

College core outcomes are infused in all our Biology curricula to some degree. This year the SAC assessed each course for how it addresses each outcome, using a rubric provided by the Learning Assessment Council (Table 1, Appendix A). The degree to which each course addresses each outcome varies. However each course sufficiently addresses at least one outcome (rated as a level 3 on a scale of 1 – 4), and most courses sufficiently address multiple outcomes.

Critical thinking is a key to success in our courses. Students are regularly challenged to apply their knowledge, interpret data, synthesize their findings with published literature, and critique the work of others in assessments including case studies, scientific papers, literature reviews, and novel questions on exams.

Communication skills are developed through the use of scientific papers, literature reviews, poster presentations, and other projects. Students are expected to use appropriate scientific vocabulary and Standard English grammar, punctuation, and spelling.

Self-reflection occurs as a piece of many assignments in our classes. For example, as part of their literature reviews, anatomy and physiology students are expected to evaluate what they have learned in the course that prepared them to read and understand the primary literature. Many instructors provide tools to students to determine their learning styles and suggest study methods to take advantage of the students' strengths.

Development of a sense of community and environmental responsibility occurs through evaluating case studies, service learning projects, learning garden projects, ecological footprint assignments, global issues projects, community resource use and evaluating sustainability models.

Development of cultural awareness occurs through the use of case studies, literature reviews, comparison of global ecological footprints, discussion of cultural views of evolution, world health, and population growth rates.

Assessing student performance on core outcomes

As part of PCC's improved Core Outcomes assessment, guided by the Learning Assessment Counsel, the Biology SAC is formally assessing student mastery of the college core outcomes of communication, community and environmental responsibility, critical thinking, cultural awareness, professional competence and self-reflection.

In 2009-2010, Biology SAC assessed the stated core outcome of critical thinking. We used a rubric to assess critical thinking as demonstrated in the lab reports of BI 112 students. The rubric was adapted from one used by the University of Washington. The project is a culmination of the students' lab exercises earlier in the term which stress the scientific method of research. The students, in groups, conducted a lab experiment that they designed themselves in order to test a hypothesis that they developed. The proper experimental design and execution required significant problem solving skills. Individually, each student wrote a paper in the same format used by research biologists to communicate their findings with the scientific world. In their papers, students analyzed the results of their experiment and related it to other work published in peer reviewed journals. Students also identified errors in the design and/or execution of the experiment that could have affected the results. Student scientific papers were collected and several papers from each lab section were randomly selected for scoring with the rubric. Thirty-two papers with accompanying rubrics were collected from the biology departments of the various campuses.

We are on target to complete assessments of the Communication core outcome and the Community and Environmental Responsibility outcome in the 2010-2011 academic year. In 2011-2012, assessment of Self-Reflection and Cultural Awareness core outcomes will occur.

Evidence of student performance on core outcomes

The results of our Critical Thinking assessment were encouraging; students are meeting this outcome. We learned that BI 112 and the associated scientific experiment and paper project are positively reinforcing critical thinking and problem solving. The average score on the assessment rubric was 3 (Developing) out of a possible 4. The average score is encouraging when one considers that BI 112 is typically the first biology class taken by students interested in health occupations and the majority of these students are initially unfamiliar with the problem solving and critical thinking aspects of biology. The majority of these students will take three terms of 200-level Anatomy and Physiology and a term of 200-level microbiology following successful completion of BI 112. These courses will require the skills associated with this core outcome and BI 112 appears to provide experiences that support skill development.

At this point, evidence that students are meeting the other core outcomes is not available. As we continue to follow our assessment plan this year and next, we will have a much better understanding of our students' development toward meeting the core outcomes. As we continue to gather assessment data, we will identify areas where improvements can be made. Future changes will be described in our core outcomes assessment reports.

As a result of the discussions around core outcomes assessment, we have learned that the teaching, learning, and assessment strategies used in many of our courses across the district are somewhat varied. We are working toward establishing more consistency, while allowing appropriate flexibility, across the district.

We will also need to evaluate our own methods of data collection and improve our assessment strategies. For example, while assessing for critical thinking, we had low faculty participation, leading to a small sample size. Only one assignment was used to demonstrate the level of critical thinking near the end of the term. Improvements in design of this assessment could help us assess the improvement of critical thinking skills during the course. Increased understanding of the importance of these assessments will increase faculty participation.

Assessment of core outcomes is complicated by problems of inconsistent entry preparation of our students and numerous other variables. These variables include different student populations by day/time/campus of class, different instructor populations, and changes to courses that make direct comparisons difficult.

Distance learning for biology courses

We currently offer General Biology, 101, 102 and 103 in a hybrid format which combines weekly face-to-face recitation, testing, and labs with online learning. One section of Biology 101 (24 students) is offered at Sylvania each term including summer, and one additional section of the full sequence is offered over the regular academic year. Recitation and laboratory hours are scheduled in evenings to maximize access for all students. Rock Creek began offering one section (24 students) of BI 101 in this hybrid format Spring term 2011.

The biology SAC prefers this hybrid format to a complete distance format for laboratory classes. Safety protocols and comprehensive laboratory skills would be impossible to replicate outside a monitored biological laboratory setting. Many of our students will enter work environments where proper lab skills and safety protocols will be required, therefore it is essential that they learn these basic skills in a supervised environment.

In addition to the standard face-to-face format, BI 241: Pathophysiology was offered in the DL format as a trial for Spring 2010. After reviewing the course assessment strategies, there were some concerns about the opportunity for students to cheat on unproctored exams. Another trial offering of BI 241 in the DL format was offered Spring 2011 with changes to assessment

protocol; exams were given face-to-face by the instructor. The SAC is comfortable with this arrangement and has agreed to support continuation of this course in the DL format.

Educational initiatives and curricular changes

Biology faculty members are very committed to various educational initiatives, and actively pursue opportunities presented by the college for training in service learning, sustainability, and internationalizing curricula. We also engage in initiatives that support our discipline.

As part of an effort to internationalize our Biology curriculum, April Ann Fong was given an opportunity to travel to China, where the main focus was learning about the ethnic minorities of SW China. She also saw many environmental challenges associated with population size, coal use, development, migrant workers, and The Three Rivers Dam. April has incorporated much of the information that she learned into the environmental portions of BI 101, BI 213, and Environmental Studies 171.

Service learning has been incorporated into the curricula for Biology 101, where students volunteer in various locations and learn that they can find biology wherever they are. For example, one of our students was a homeless youth advocate and she volunteered to work on homelessness issues. She struggled to make the connection of this topic with Biology until she understood that these youth lacked the basic needs provided by their habitat (food, water, shelter) and suffered many health issues such as malnutrition and sickness. Her service directly engaged her with the biology information that she was learning.

For BI 211-212-213, students volunteer in biologically related agencies and organizations and apply specific parts of the curricula to their service. For example, pre-health students may apply genetics and physiology aspects of the course to volunteer work. Other students choose environmental organizations, such as the Nature Conservancy, Free Geek, and City Repair, and learn what these organizations are doing to address environmental issues. The total service learning hours provided by biology students in the 2009-2010 academic year was 903.5 service hours with 48 different community partners.

Students in Marine Biology (BI 142) have the opportunity to engage in service learning projects related to water quality issues. The lab manual for this course has been revised to support inquiry-based learning. For example, students compare the accuracy of three different methods of measuring salinity, investigate the effect of temperature on molluscan heart rates and look at the mammalian diving reflex in class. The special topics covered in marine biology attempt to make students more aware of the interconnectedness of marine and terrestrial systems. Discussion of the effect of human activity on the health of the oceans naturally lends itself to the discussion of international issues.

Alexie McNerthney and Lynn Larsen have each been awarded International Faculty Development Seminar trips through the Council on International Educational Exchange (CIEE).

These seminars will support internationalization of our curriculum in several courses. Alexie will be traveling to Costa Rica to learn about how this nation engages in biological conservation and has built an economy on the sustainable use of resources via ecotourism. This will support curriculum for BI 213, BI 101 and BI 101H. Lynn will travel to Botswana and South Africa to learn about contemporary regional issues, including economic growth with preservation of natural resources in these African nations. These faculty tours are being funded by the college via The Office of International Education in support of the effort to internationalize our curriculum at PCC.

Students and the Community

Student Demographics

The population of students taking Biology courses at PCC has grown significantly since our last program review. FTE increased 26.3% between 2003-04 and 2009-10. (1328.7 in 03/04 to 1678.4 in 09/10) and unduplicated headcount increased 22.2% (from 5727 in 03/04 to 6999 in 09/10). Increases have varied between campuses (Table 2, Appendix A). As a result of this increase, we have increased the number of CRNs offered by approximately 40%. For example, the number of credit hours increased from 12,369 in Fall 2003 to 17,194 credit hours in Fall 2009.

We have also increased the number of night and weekend classes by over 50% to accommodate the greater number of students, as well as to accommodate students who need a more flexible schedule. For example, the number of night and weekend CRNs increased from 67 in Fall 2003 to 106 in Fall 2009.

Strategies for access and diversity

The Biology SAC supports the following practices for increasing access and diversity among the staff and student population:

- Recruiting and retaining a diverse student population through BI 95 development, and work with CAMP, BRIDGES, Upward Bound, and Middle College.
- Building a critical mass of culturally competent employees by working with the internationalization counsel and training in Summer Institute of International Communication.
- Creating partnerships and relationships that are inclusive of all segments of the community through service-learning, and work with CAMP, BRIDGES, ROOTS, MESA, PAVTEC, middle college, TRIO, Habitat team, SW Neighborhood Inc, and Portland Parks and Recreation.

The diversity of biology students has increased since the last program review, although biology students are less diverse than the general college population. In particular, the percentage of Asian/Pacific Islander students increased from 8.9% in 03/04 to 11.8% in 09/10 and the percentage of Hispanic students increased from 5.1% in 03/04 to 6.3% in 09/10 (Table 1).

Table 1. Ethnicity of Biology Students compared to All Students, Fall 2010

Students enrolled at PCC, college-wide	Total	African American	Asian/Pacific islander	Native American/Alaska Native	Hispanic	White Non-hispanic
Biology	5,127	4.4%	11.8%	1.3%	6.5%	76.0%
All subjects	21,651	6.0%	8.7%	1.5%	8.4%	72.0%

Biology is currently working with the following PCC programs to increase the diversity of students entering our program, to increase retention of students from underrepresented groups, and to facilitate their move from community college to a 4-year program.

- Portland Bridges to Baccalaureate Program (PBTB) – Portland Community College - Portland State University partnership funded by the federal National Institutes of Health, with the goal of increasing the diversity of highly trained biomedical research personnel investigating health disparities.
- College Assistance Migrant Program (CAMP) - a federally-funded program designed to support students from migrant and seasonal farm worker backgrounds during their first year in college. The program provides students with both financial assistance and support services, with the goal of preparing them to continue their education at a four-year college or university.
- ROOTS - a federally-funded TRiO program available at Cascade and Sylvania dedicated to helping students at Portland Community College achieve their educational goals. The program helps low income, first generation students and students with disabilities stay in school, transfer to other colleges or universities and/or graduate from PCC.
- Educational Talent Search (ETS) –an outreach program available at Rock Creek designed to help low income and educationally disadvantaged students to aspire, prepare for, and enroll in the college of their choice. The program provides academic, career, and financial counseling to its participants and encourages them to graduate from high school and continue on to postsecondary education. Talent Search also serves students who

dropped out of high school by encouraging them to reenter the educational system and complete their education.

Responses to Student Needs

Since our last program review, the PCC Biology SAC has responded to student needs in several ways. First, we have created a new course, BI 112, to prepare allied health students for the rigors of BI 231, 232, 233 and 234. This effort was initiated in response to a high drop/fail rate in BI 231 and to student feedback that BI 101 did not provide adequate preparation for BI 231-233. This lack of adequate preparation for BI 231-233 was not unique to PCC, but was a common concern among the colleges and universities of Oregon. Several state-wide meetings occurred that led to the development of a new pre-requisite course for BI 231-233. Courses similar to our BI 112 are now offered at many of the community colleges in Oregon. Our BI 112 course was also designed to serve as the pre-requisite for BI 234 to streamline the number of pre-requisite courses required for our pre-allied health classes.

We had previously relied on BI 101 as the pre-requisite for BI 231 and BI 234. This course was offered to both allied health students and non-majors as a laboratory science class. These two groups of students are very different and have different needs. The new course (BI 112) appears to be working well and the new BI 112 lab was designed to demonstrate the practical aspects of what they have learned in lecture as well as extensive work with the microscope.

After the development of BI 112, the laboratory components of BI 101, 102 and 103 were completely reworked to create a true non-majors level biology series. Lab activities now support a population of students with little or no biology background. An emphasis is placed on directly supporting content learned in lecture, and on the applicability of biology to our personal lives. Reflective exercises are incorporated into lab activities that support the student in the practice of critical thinking.

Pedagogical changes in BI 231-233 coursework also were made as a result of the state-wide meetings focusing on better preparation for students entering health care programs. Because we were able to remove some of the content that is now covered in BI 112 from BI 231, we were able to shift our curriculum loads in the three terms and create time to include more case studies, literature reviews, and application practice.

Student interest in sustainable practices has increased greatly since our last program review. In the next couple of years, the biology department (and other departments across the district) will be identifying those courses with a sustainability aspect with a special notation in the schedule of classes so students will know that part of the course will focus on sustainability.

Current and projected demand and enrollment patterns

Since the last program review in 2003-2004, end of term enrollments in Biological Sciences as reported by Institutional Effectiveness (IE) have generally remained strong and increased significantly in recent years (Table 2). The slight drop from 06/07 to 07/08 of -0.2 % has been offset by an increase of 14.0% from 07/08 to 08/09. End of term results for Biology for Fall 2009 are not yet available but early enrollment increases recorded during the first day of class were dramatic: Sylvania 8.2%, Rock Creek 10.8% and Cascade 19.1%. If we retained these students through the remainder of the academic year and attrition rates remained constant, 2009-2010 numbers should be significantly higher.

Compared to all students enrolled in credit courses (unduplicated head count) the number of students enrolled in one or more biology courses varied from 13.52 to 14.07% from 2006 to 2009 (Table 2). FTE generated by Biology students compared to all students enrolled in credit courses varied from 6.71 to 7.02% from 2006 to 2009 (Table 3).

Table 2. Number of students enrolled in biology courses from 2006 - 2009. Source: Institutional Effectiveness SAS system, Banner end-of-term extracts.

Number of Students Enrolled in Discipline	Year		
	2006-07	2007-08	2008-09
Biology	5,767	5,728	6,432
All Credit Students	41,008	42,368	47,518
% of students enrolled in one or more biology classes*	14.07%	13.52%	13.54%

*Each student counted only once

Table 3. FTE enrollment of students in biology courses compared with all students from 2006 to 2009.

FTE Count of Students Enrolled in Discipline	Year		
	2006-07	2007-08	2008-09
Biology	1,316.3	1,314.0	1,497.5
All Credit Students	18,747.3	19,588.6	22,311.7
Biology student FTE	7.02%	6.71%	6.71%

Prospects for future growth remain strong. Courses within the biological sciences not only fulfill the needs of the traditional transfer students and meet a portion of the general education requirements, but many are also required and support the expanding allied health science fields and emerging biotechnology and environmental/green programs.

In response to the growing demand for biology classes within the community, biology offerings have expanded at Southeast Center. With the help of many people at the Sylvania campus and Southeast Center campus, one section of BI101 was offered for the first time in Fall 2006. The lecture portion was held at the Southeast Center campus and the lab was offered at Marshall High School. This was only possible because of the cooperation of the dean, department chair and the work of the two laboratory support staff Brett Schaerer and Cathie Cookus who put together “labs in a box”. It also involved the support of the shuttle driver between Southeast Center and the Sylvania campus. This course was offered in this format as a single section during Fall, Winter and Spring terms until Fall of 2008.

After remodeling of a room at Southeast Center and investment in laboratory equipment at this campus, we were able to bring the BI 101 lab to the Southeast Center campus and also add the BI 112 course. Initially a lecture /laboratory course for 20 students was offered for BI 101 and BI 112. We now offer a 40-student BI 112 lecture, two 20-student BI112 labs, and a 20-student lecture/lab section of BI 101.

A biology faculty member is actively involved in meetings for the bond measure and building at the Southeast Center campus. We anticipate greatly expanding the biology offerings at the Southeast Center campus upon completion of a new building with additional laboratory classroom and support/storage space

Faculty Demographics

Full-time and adjunct faculty ratio

Due to our growth, there is a constant need for additional faculty. Since approval of full-time positions does not keep pace with department growth, we often hire part-time faculty members to meet department needs. Working within the limitations of the laboratory space available, courses are offered according to student demand, support of other programs such as allied health sciences, and the long-term goals of PCC and biology departments. Each campus hires biology faculty with these parameters in mind. The preference is for full-time faculty since they provide stability, institutional memory and the ability to perform college business. According to a Memorandum of Understanding in the 2009-2011 Faculty Contract, the ratio for course sections is that 43% should be taught by full time faculty, and 57% should be taught by adjunct faculty. Instead, the actual ratio is such that adjunct faculty teach the vast majority of our Biology courses. For example in Fall 2009, 79 (31%) sections were taught by full-time faculty and 177 (69%) sections were taught by part-time faculty college-wide in biology.

Instructor staffing, both full time and part time, is geared towards the demand for education from the community and state funding to support instruction, materials and supplies. Both factors are involved in determining staffing levels. Currently we have 17 permanent full time faculty, two temporary full-time faculty, and 76 adjunct faculty college-wide (two one-year appointments at Rock Creek were also begun for Spring 2011).

The high ratio of part-time to full-time instructors does not allow for adequate mentoring and support of part-time faculty, which limits our ability to recruit and retain quality instructors. This results in a high turnover rate of part-time faculty, which in turn increases workload of department chairs in the continuous hiring process and also places further mentoring demands on the full-time faculty (Table 4).

Table 4. Number of full time and adjunct instructors at each campus, Academic year 2009- 2010.

Campus	Full time instructors	Number of Adjunct Instructors (averaged over 3 terms)
Cascade	5	21
Rock Creek	5	26
SE Center	0.5	0
Sylvania	7.5	31

The average length of service for our current full-time faculty is 14 years at the institution, so turnover rate is low. For part time faculty, the turnover rate is higher, though some part time faculty that have been with the College for over 20 years. It is common for adjunct faculty to work only one term before finding employment elsewhere.

As of Fall 2011, of the full-time faculty across the district, 80% have a doctorate degree and 20% have a master’s degree. Part time faculty tend to have less overall teaching experience than full time faculty. Many of the part-time faculty are well qualified and excellent instructors. Indeed without large numbers of these dedicated individuals we simply could not offer our programs. However the demand for qualified part-time faculty often exceeds availability. While we would like to believe that we live and teach in Garrison Keillor’s Lake Wobegon where all of the faculty are “above average”, this is simply not the case. Each part-time faculty member indeed meets minimum qualifications as established by the Biology SAC, but many are teaching outside their spheres of expertise. For example due to necessity we typically have had individuals with little or no experience in the subject area teaching human anatomy and physiology.

There remains an overreliance on the presence of part-time faculty to teach courses within the discipline. Efforts to increase the full-time to part-time ratio have been hindered to a large extent

by a fluctuating economy and reflected in significant funding oscillations for community colleges. Even in better financial years, administration often chooses to add administrative positions such as a fourth division dean at Rock Creek, rather than faculty.

While Rock Creek was delighted to have two full time positions added in the Fall of 2008, both of these were replacements: one for a faculty member (Cathy Pake) who became seriously ill and resigned and the other an instructor (Kendra Cawley) who returned to her original position to revive the Biotechnology/ Bioscience Technology position when that program was brought back from hiatus.

When Kendra Cawley left the campus to accept an administrative position with Academic Services, one of the new Biology hires was switched to Biotechnology. So Rock Creek has not gained faculty but remains down one full-time position.

There is one troubling consequence of having so many adjunct faculty with their varying backgrounds and short tenure. There is inconsistency in grading, particularly of our difficult courses. Too many A and B grades are assigned (Table 3, Appendix A), and these “successful” students gain admittance into university programs. As reported by Ed DeGrauw, Anatomy and Physiology instructor at Sylvania, based upon information presented to him from the Academic Services Office, a potential major consequence of this inconsistent quality of graduates of our anatomy and physiology sequence several four year colleges and universities have expressed that they may no longer accept our courses as fulfilling their requirements for admission.

Some campuses have experienced a revolving door of upper level administrators, particularly Campus Presidents and Deans of Instruction. While each individual is certainly committed, competent and hard-working, there has been a distinct lack of continuity and awareness of campus history. Further there has been considerable variation in support for Biology at the Division Dean level among the campuses. One aspect of this is the disproportionately large number of sections offered at Cascade given the overall size of the student population compared to the other two campuses.

Faculty diversity

We need to do a better job as an institution of hiring faculty from various racial and cultural backgrounds. In every hiring situation over the past ten years, this has been discussed and we are mindful of the imperative need. However, truly qualified candidates from these diverse backgrounds do not seem to be applying in sufficient numbers. As of fall 2009, there were 12% minority (Asian, Hispanic, Black or Native American) faculty, counselors and librarians district-wide. In biology, two of 17 full-time faculty have minority status - this is in-line with our district-wide numbers. In PCC's service area as of 2006 the population as a whole was 74% white, 12% Hispanic, 7.5% Asian, 4% black and 1% Native American.

Instructor Qualifications

In order for a part-time instructor to qualify to teach a college credit Biology course, he or she must have a Master's degree in the subject area or Master's degree in a related area plus 30 quarter hours of graduate credit in the subject area. We have recently decided to allow exceptions to the completed degree requirement for graduate students who are on track to graduate within the next two terms, though they must still meet the 30 quarter hours of graduate credit in subject area. This change will allow us to more competitively recruit new part-time faculty.

The subject area of Biology is a diverse academic discipline. In the past there were many graduate departments of Biology across the nation. Most of those have splintered into areas that are less broad in scope. Therefore, currently very few departments offer graduate degrees in "Biology" per se. On April 11, 2003, the Biology SAC approved the following list of disciplines that should be considered to be in the subject area of Biology. The department chair can make the final determination about the applicability of a particular degree to teaching a particular biology course.

Accepted Degrees for qualification for teaching Biology courses at PCC	
Ecology	Microbiology
Evolution/Evolutionary Biology	Physiology
ESR (Environmental Science and Resources),	Entomology
Fisheries	Animal Behavior
Marine Biology	Anatomy
Wildlife Biology	Medical Doctor (MD)
Forestry (Forest Ecology)	Doctor of Dental Science (DDS or DMD)
Animal Sciences	Doctor of Veterinary Medicine (DVM)
Plant Sciences	Doctor of Osteopathy (DO)
Botany	Doctor of Podiatric Medicine (DPM)
Zoology	Doctor of Chiropractic Medicine (DC)
Genetics	Education/Science Education
Molecular and Cellular Biology	

Professional development activities

All of our full time faculty and many of our adjunct faculty continue to actively participate in professional development activities. One notable development since our last program review is our collective commitment to learn about the ocean environment and associated coastal and marine issues, and how our students can develop careers in the ocean sciences. This has been fostered by our relationship with a relatively new organization, The Center for Ocean Sciences Education Excellence (COSEE). This organization, funded by the National Science Foundation and the National Oceanic and Atmospheric Administration (NOAA), is a consortium of ocean

science research institutions and formal education entities. COSEE connects scientific partners with students and faculty to promote ocean literacy and prepare students for careers in ocean sciences.

Since the first West Coast COSEE offering in the Summer of 2009, many of our faculty (Alexie McNerthney April Fong, Linda Fergusson-Kolmes, Kevin Lien, Sandy Neps, Tom Robertson) have participated in one or more weeklong residential summer workshops designed specifically for community college faculty, hosted by the Oregon Institute of Marine Biology in Charleston, Oregon. These rigorous and effective workshops increased our knowledge of the latest ocean research, and also provided us with teaching tools for use in the lab and classroom. This effort has opened the doors for several students who are now on their way to careers in ocean science. According to COSEE, the direct contacts made with the community college faculty have been essential in the recruitment of students for the Promoting Research Investigations in the Marine Environment (PRIME) program. Most of the students applying for PRIME internships in the past two summers did so because they were encouraged to apply by community college instructors.

Professional and personal growth occurs while participating in college projects, and our faculty have been engaged in many of these since our last review. The following is a list of committees, workshops, and advisory boards in which Biology faculty have been engaged:

- Anderson Conferences
- Cascade Part-Time Faculty Institute
- Climate Change Teachers Seminar
- Curriculum Committee
- IIP committee
- Introduction to Learning Assessment Workshop
- Learning Styles Lounges at Cascade
- Library Advisory Committee
- New Natural Resources Management degree committee
- Oregon Academy of Science Planning Committee
- PCC Sylvania Eco-Charette for the Bond
- PCC Sylvania Site Committee for the Bond
- Service Learning Advisory Council
- Sustainability Practices for Academic and Resources Council (SPARC) Committee
- Sylvania Diversity Council's Program Committee
- Sylvania Focus the Nation Event
- Sylvania Green Team
- The Honors Program Committee
- The Rock Creek Green Team
- TLC committee and the Student Development committee
- Visioning committee for the Environmental Center
- Westside Bond Committee

Biology faculty have served on many hiring committees including the District Service Learning Director, the permanent division dean for Science and Engineering at Sylvania Campus, several full time and temporary Biology positions at the three campuses, and the interim Sylvania Environmental Center Coordinator.

Faculty have engaged in other activities for professional development in our field. For example, Linda Fergusson-Kolmes attended the NCSR Marine Fisheries Institute and took a credit course on Symbiosis at the Oregon Institute for Marine Biology. She is also a Northwest Sustainability Initiative Faculty Fellow. April Fong is a member of the Northwest Earth Institute Discussion Group through the TLC and the Pedagogy Book Club through the TLC. Kevin Lien attended two Consortium for Undergraduate Research meetings – one in Rochester NY and one in Edmonds, WA. He also attended the Siskiyou Institute twice and the COSEE institute once over the past three years.

While most in-house professional development activities are free to faculty, those associated more directly with our discipline are not. We rely on very limited funds for these activities. Funds have fluctuated from year to year, and when available, division-allocated funds are usually around \$400-500 per year per faculty. The TLC and the Staff Development Grant Committee also have small amounts of funds available for professional development.

The funds available are put to good use. Financial support for Sandy Neps to attend Annual National HAPS (Human Anatomy and Physiology Society) meetings from 2005-2009, resulted in the use of more formative assessments, alignment of course content to the HAPS guidelines, and addition of data collection in labs using Vernier equipment in BI 231, 232, 233 at Cascade campus. In addition to these large scale changes, numerous best practices methods are now used in her classes to assist students in learning. Mentoring of part-time faculty has improved. Funding was not approved for her to attend the 2010 National HAPS meeting.

Sandy also participated in the HAPS-I (HAPS institute) graduate course program at the 2008 HAPS meeting, taking a course in Advanced Renal Physiology. As a result of the HAPS-I participation and more student-centered approach is now used in her classes for teaching renal physiology. Tuition reimbursement for this course was not provided by PCC.

In preparation for future offerings of BI 160-Ecology/Field Biology:Coast at Cascade campus, Sandy Neps also took advantage of the opportunity to attend COSEE workshops in the summer of 2009. The cost of the workshop was covered by COSEE, but tuition for graduate credit hours was not provided or reimbursed by PCC and was covered by Sandy. To continue development of her marine biology knowledge, partial tuition reimbursement was provided for her to take BI 360-Introduction to Marine Biology at PSU in Fall 2009.

Full reimbursement for tuition would greatly reduce the personal financial impact of this type of professional development on faculty and would encourage greater participation. For these three graduate credit courses, the total expense to the instructor was more than \$1000.

While funding levels for professional development are inadequate for full-time faculty, they are even more limited for part-time faculty, who often use their personal finances to support their professional development. For example, Brett Schaerer paid his own registration fees and travel expenses to attend the NWBiology conference in 2009. Wendy Connelly attended the Northwest Regional meeting of POGIL (Process Oriented Guided Inquiry Learning) with her own funds.

Many of our faculty participate in events offered through PCC, primarily the campus TLCs. For example, various faculty have participated over the last year in the following activities: Cascade Part-Time Faculty Institute (April 2011), Climate Change Teachers Seminar (February 2011), Introduction to Learning Assessment Workshop (February 2011), Anderson Conference: Shifting From a Grading Culture to a Learning Culture: Assessment Theory and Practice (January 2011), FERPA Training (January 2011), Learning Styles Lounge: Kinesthetic and Tactile Learners (October 2010), Learning Styles Lounge: Distracted and Distracting Learners, (October 2010), Learning Styles Lounge: Teaching to Different Learning Styles (October 2010). Biology departments at the individual campuses also host training for their faculty, including training on the use of new technologies in the laboratory.

Classrooms and laboratory space

The steady increase in enrollment since our last program review has put us at maximum capacity with regard to available space in the classrooms and, particularly, laboratories on all campuses. Student demand for Biology courses has increased steadily since 2003. To meet these demands, we have increased our use of available classrooms and laboratories, and our labs spaces are now in use from 8 am to 10 pm on many days of the week, including Saturdays. (Figure 1, Figure 2, Figure 3).

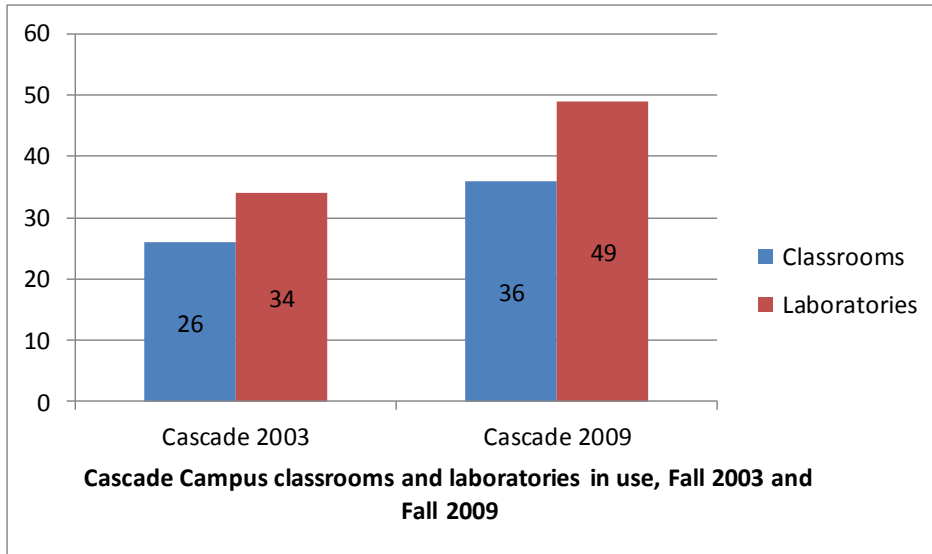


Figure 1. Number of classrooms and laboratories in use for Fall term 2003 and Fall term 2009, Cascade Campus.

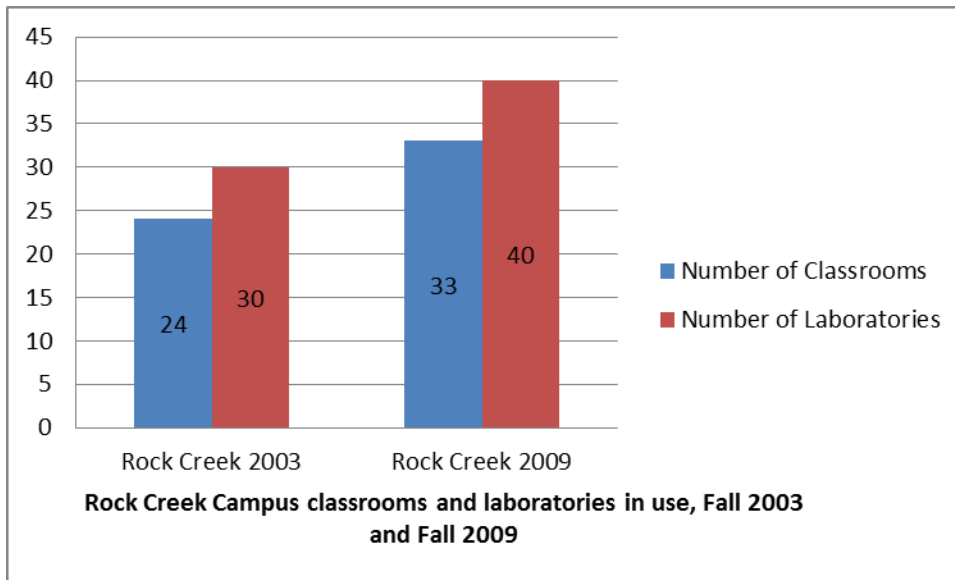


Figure 2. Number of classrooms and laboratories in use for Fall term 2003 and Fall term 2009, Rock Creek Campus.

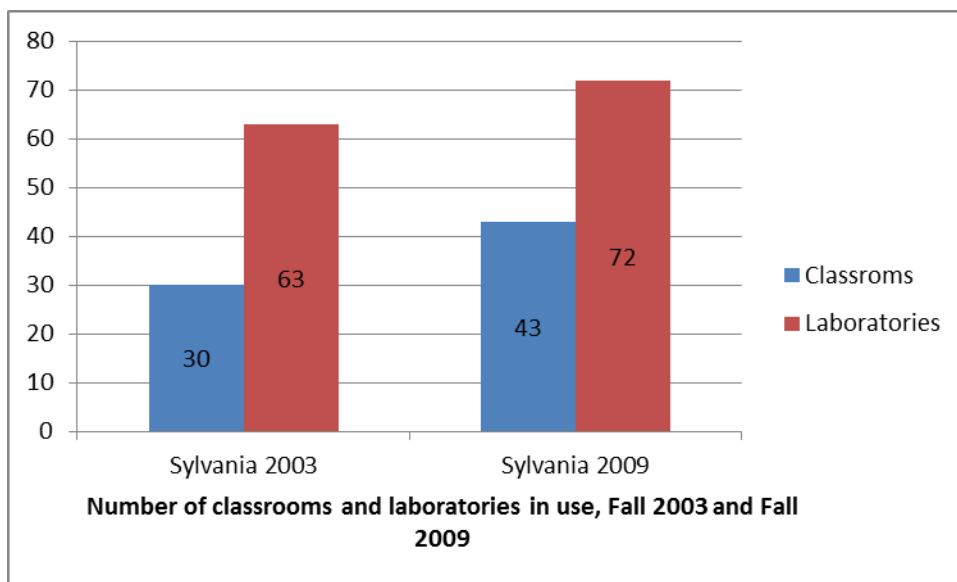


Figure 3. Number of classrooms and laboratories in use for Fall term 2003 and Fall term 2009, Sylvania Campus.

Proper facilities are essential to effective teaching, especially for laboratory sciences such as biology. We have had numerous positive changes in our facilities resulting from the bond measure passed in 2000. Upgrades and expansion of the laboratory and lab prep space, along with new biology greenhouse at Sylvania, and the new buildings at Southeast Center, have all improved our ability to serve our students.

Despite these improvements, the current high level of enrollment means that our laboratory rooms are generally at or near capacity, leaving little free time to do regular restocking, maintenance, and lab preparation activities or hold open labs for student review. All campuses could use at least one additional biology lab room to meet our present demand, and if current trends continue, two or three more rooms would be ideal. The storage spaces for laboratory materials are much improved thanks to the prior bond measure, but the Sylvania campus needs more storage room/shelf space to adequately support the labs. Plans are underway with the current bond measure to reconfigure our preparation and stock area at Sylvania, to provide more efficient use of that space.

Our facilities are generally well-equipped with current technology. Nearly all of the rooms that we teach in (lecture and lab) are equipped with multimedia podiums. We also have additional computers dedicated to the biology labs which students use to look up information on the internet through the wireless network, run specialized software to complete lab activities, work collaboratively on documents or electronic presentations for their term projects, and collect data from experiments through third-party sensors and software. We also have the means to project microscope images to the entire class which is extremely helpful for students learning basic microscope technique and/or histology.

Equipment such as student microscopes, prepared slides, glassware, models, balances and spectrophotometers is generally adequate for the number of sections we offer on each campus. Acquiring a few more of certain items would mean fewer ‘bottlenecks’ of students competing to use a particular item. If new lab rooms are created as a result of the current bond project, they will obviously need to be equipped for the course we intend to teach in those rooms.

While our current technology generally works well for us, it could work better. Training all of our adjunct instructors to use certain technologies poses a significant logistical challenge. In the Fall of 2009, we had recurrent problems in connecting to PCC’s wireless network, which adversely affected Biology 101 students trying to complete their lab activities. Transitioning to more portable computers, (laptops or netbooks) for student use in labs could be beneficial on many fronts: keeping our students up-to-date with the current “cloud-based” computing paradigm, improving lab safety (fewer cords, smaller footprint on the lab tables), decreasing power consumption, and minimizing the physical storage space required.

Acquisition of new technology is probably a lesser concern than regular upgrades of what we currently have, but it could help in certain areas. Having more of certain computer-connected equipment (e.g. Vernier sensors) would enable us to incorporate these assets into our labs more formally and give more of our students an opportunity to benefit from them. Our video microscope systems work fine, but they are getting outdated and are limited in number. Ideally we would like to have an easy-to-use, high resolution video microscope system available for every lab room equipped with student microscopes.

The primary concern with our lab equipment is wear and tear; the equipment we have is getting used more frequently, so we need to repair and replace worn and/or damaged equipment more frequently (e.g. anatomical models, microscopes, prepared slides, and glassware). With our high enrollment, we are also using more consumables such as chemicals, microbiological media, and dissection specimens. And despite the long-term trends of increasing enrollment and price inflation, the budgets for lab supplies have remained relatively flat.

Library and information sources

The Biology SAC has in general maintained a positive working relationship with the library. One member of the full-time faculty serves on the Library Advisory Committee. This allows more direct communication between the library and the biology faculty. Faculty members have provided input to the library about ways the library webpage design and available databases can help biology students be more successful in their search for appropriate peer reviewed journals and other materials. Many biology instructors include a library orientation, taught by a librarian, as a part of their course. These orientations are conducted in a way that allows students to use computers to search library holdings. The orientations are geared to the specific assignments associated with a particular biology course (Table 4, Appendix A).

The library documents use of the reserved group study rooms in the library but does not record the specific discipline associated with each study group. Anecdotal information does suggest, however, that many biology students are booking these rooms on a regular basis.

Support Services

Clerical and technical support

Clerical and technical support is strong at all campuses during regular business hours (7:30-4:30). Technical support is also strong on evenings and weekends but clerical support is inadequate (no staffing) during those times. A large number of evening and weekend lectures and labs are offered on each campus (Table 5). More clerical support should be offered to our instructors and students during the evenings and weekends. It would be beneficial to create a classified clerical position for these unstaffed hours.

Increases in enrollment and in the number of classes offered, has put a strain on administrative support, registration services, and student advising. We have the same level of administrative support in 2009 as we had in 2003.

Table 5. Number of sections offered at Sylvania Campus, 2009, comparing day and evening/weekend hours.

Term	Time of Day	
	Day	Evening and weekend
Winter	68	15
Spring	38	13
Summer	29	9
Fall	74	41

Laboratory support

With the tremendous increase in enrollment and an increasing demand for laboratory organization, it would be beneficial to create an additional classified position for laboratory support. Each of the main campuses currently has the equivalent of 2 or 2.5 FTE classified lab technicians, along with a handful of casual, student help, and/or work-study laboratory employees.

The labs taught at Southeast Center are supported by Steve Ballew whose current status is Instructional Support III. He is half-time at SE Center and half-time at Sylvania Campus. Next

Spring term he will be required to reapply for this position, if it becomes permanent. He is the only lab support person at SEC and will be increasing his responsibilities there this Fall with the addition of a CH 100 lab.

Cascade campus employs one full-time position, and two $\frac{3}{4}$ time positions to support the labs in the areas of Biology, Chemistry, and Physics. Classified staff is able to support weekday and evening courses, however weekend labs are supported by casual employees and work study positions. It would be beneficial to create a classified position to cover weekend labs.

The Biology and ESR Department at Rock Creek currently employs 2 full-time positions. They support laboratories in all areas of biology. Rock Creek employs three casual workers (35 hours/week) and one student worker (average of 5 hours/week). One casual worker staffs the open lab times. Numbers of workers vary according to funding available. The laboratory support room has limited staff throughout the week including weekends.

This level of support staff is generally adequate to accomplish our primary educational mission. However, there is room for improvement. Our reliance on part-time casual and student help inevitably promotes inefficiency with perpetual re-training of new lab staff, duplicated work due to poor communication between part-time staff, and numerous other problems stemming from short work shifts. With casual/student employees, the quality and quantity of work done can vary, and finding qualified employees poses a challenge, especially when their job funding depends on receiving a work-study award.

One possible way to improve laboratory support staffing is to consolidate the funding for several different part time positions into a smaller number of benefitted positions which are at least 0.5 FTE. This should allow us to hire more consistently excellent employees, train them once, and retain them longer-term. As an example, when Sylvania added a half-time benefitted lab tech position, this eased the burden of an excessive workload on the two full-time lab techs considerably. Sylvania still employs casual/work study employees in the lab, but we are now much less reliant on them to perform our essential duties. All of the main campuses have expressed concerns about the current level of funding for lab staff being sustained in the future or that enrollment will continue to increase without a corresponding increase in support staff.

Tutoring support

In Fall term 2007, Life Sciences at Sylvania opened a small tutoring center to support all biology students. The Center was staffed Monday through Saturday by full-time and part-time faculty, as well as student workers and unpaid volunteers (Table 5, Appendix A). Full-time faculty sometimes hosted part of their regular office hours in the tutoring center.

Three years of experience with the tutoring center at Sylvania Campus revealed three things. First, the center was overwhelmingly used by students enrolled in Anatomy and Physiology

courses (BI 231, 232 and 233). Only a handful of students visited the center with questions about other Biology courses. Second, the amount of actual tutoring taking place in the center was minimal; instead, students worked independently on learning and reviewing anatomical structures with the help of models and histology slides. Also, as the center was staffed by students, volunteers and faculty with a variety of backgrounds, the ability to help students varied throughout the week and term.

In response to these trends, Sylvania closed the tutoring center and replaced it with a series of “open labs” specifically for Anatomy and Physiology students, and these are staffed by the same instructors who teach the labs. Students have access to many more teaching materials, since they can use our dedicated lab models as well as the extra materials that were part of the tutoring center collection. We are able to support up to 24 students at a time, whereas the tutoring center only held a maximum of about six students at a time. In Winter term 2010, 353 students attended open lab times.

Our program could benefit greatly from additional funding dedicated to support of our open labs. The tutoring budget at Sylvania Campus is currently \$4000/year. When staffed by part-time faculty, this means we can only offer 4.75 hours/week of open lab time. The demand for more hours is high. To meet this demand, full-time instructors volunteer to hold their office hours in the lab, but this places conflicts for faculty who need to have one-on-one conversations with students. Also, we are currently relying on additional funding from a grant, which will end this year.

At Cascade campus, there is cooperation between the biology department and the Learning Center for tutoring. Approximately 15-20 hours per week of Open-lab/Tutoring time (for BI 112, 231, 232, 233, and 234) are offered for biology students. Open-labs are hosted by full-time faculty as part of their contracted hours and by part-time faculty who are compensated at the part-time tutor rate. Current budget for supporting part-time faculty at Cascade to conduct open labs is \$2200/term (fall, winter, spring) and \$1200/term (summer). Although additional open-lab time would benefit students, limited funding and limited lab space prevent additional open-lab hours. Starting in the Winter of 2011, we established a better system of record keeping and in future program reviews will have data to demonstrate the use of our open-lab times.

We are hopeful that with the new bond measure, there may be a way to support an open lab space physically associated with the learning center at Cascade Campus. This would allow us to offer a greater number of open-lab hours and would allow better use of the lab rooms for classes. Approximately 3-5 hours of tutoring per week are offered in the learning center (TH123). Some tutoring is being offered by instructors as part of their contractual hours. Most of this tutoring is being offered by former students who volunteer or are compensated from the learning center budget.

Although Rock Creek has a Student Learning Center on Campus, Biology students were not using this resource. Therefore faculty organized tutoring specific to biology corresponding with open lab times. Rock Creek Campus offers nine or more open lab hours per week. We have five hours of tutoring available in RC 7/122 and 7/126. We now have more students taking advantage of tutoring.

Student services and their impact on students

Advising

Advising students has always been a part of normal teaching duties. Faculty help students determine which classes are needed to meet degree requirements, what classes will serve them better in their career choices, and what classes they might enjoy. The load for advising has increased over time, probably because there has not been a proportional increase in advisors as student numbers have increased, or perhaps because students feel a greater sense of entitlement to more help in steering through the challenges of academia. Regardless of the cause, the increase in advising duties takes away from time spent educating students on the topics that are covered in the courses.

Students report that they have to wait hours to see an advisor, and their experience with the advisor is less than ideal because of time constraints, so they tend to turn to an instructor within their major area of study for advice. This arrangement is completely workable (and in practice at many other institutions of higher education) assuming that the teaching load is not so high. The faculty members' first responsibility is the education of the student in their topic areas and to address these concerns for all students before moving into areas of general advising. Due to the increased demand for advising it would be desirable to either increase the number of advisors available to students or decrease the teaching load and train faculty to also act in this capacity.

In terms of specific career advising these comments will be limited to health career advising as this is a rapidly growing area that affects the life sciences. First, PCC should be commended for having an office dedicated to advising this rapidly growing group of students and that the effort is made to inform students as to the program choices in the area, course requirements, and GPA requirements. Again the high number of students and the competitive nature of the entry into many of these programs have brought a large increase in the number of students coming to faculty looking for advice. In order to best serve the needs of the student, advisors and faculty need the time to explore the options that are available. Given the competitive nature of admission to local schools and the job market for graduates, the knowledge base needs to extend beyond the Portland Metropolitan area.

Our PCC advisors (and faculty) lack the time to educate themselves on the various and changing options available for students seeking health care careers. Again the solution is either an increase in the number of advisors and the expectation that they advise students beyond the regional level and/or an increase in time availability and training for faculty to take on this role.

The expectation to pick up the increased demand for these services without the support of the institution hurts the overall educational experience of the student and their chances for an easy transition into professional programs.

Office for Students with Disabilities

The biology SAC recognizes the essential function of the Office for Students with Disabilities (OSD) in helping students to be successful. Although most of our work with OSD has a positive outcome, the biology SAC has had increasing concerns about how the OSD communicates with faculty and with their expectations of faculty. It is becoming less evident that OSD is interested in working within the constraints of faculty availability.

The OSD commonly requires that faculty provide students with extended time for all quizzes, lab practicals and exams. This requires faculty to proctor extended assessment time in addition to their regular teaching duties. For a regular two-hour exam time, the faculty must commit four hours of their day to proctoring an exam for an OSD student. The OSD states that they are not required to provide testing times. We have increasingly seen students unable to get into the testing center at OSD for finals. If OSD is going to require that students have additional time, then it seems OSD should also provide the mechanism for that to happen. Faculty are extremely busy during finals week and adjunct faculty are not compensated for this time spent proctoring exams.

There are also concerns about appropriate conditions placed during assessments. We have had an instance in which OSD insisted that a student be allowed to use a calculator during testing in Bi112. The faculty member was informed that unless the CCOG specifically restrict the use of calculators, then the student should be allowed to use a calculator. This was for exams and quizzes covering the metric system and scientific notation. As another example, an OSD advisor allowed a student permission to use notecards during an exam. This does not conform with biology department policy.

Testing Centers

Students make frequent use of campus testing centers, where proctored make-up exam times are offered, should an instructor allow a student with a valid excuse to make up a missed exam. A testing center is available at each campus, although campus-specific policies vary. Cascade and Southeast Center require appointments for make-up exams, while Sylvania and Rock Creek campuses do not. Cascade and Rock Creek campuses have very specific hours (Cascade on Mondays at 4 pm, Tuesdays at 9 am, and Wednesdays at noon whereas Rock Creek has open hours on Mondays from 11 am until 3 pm, Tuesdays from 9 am until noon, and Wednesdays from 4 pm until 8 pm). At Southeast Center and Sylvania, the weekly offered time slots vary and must be checked on the Testing Center calendar (printed or online). Cascade campus is the only one that explicitly states that no more than 10 students total are allowed during each time slot, although all testing room spaces are small.

We recently confirmed that testing services at Southeast Center do not have procedures in place to ensure that prohibited aids are not used. Students are left alone in the testing room without a proctor. Conversations have been initiated with Southeast Center staff to develop proper proctoring protocols.

The biggest inconvenience is not having hours that work for our students' schedules. Limited space has caused some students that planned to make up an exam to be unable to do so at the planned time, which delayed the administration of the exam for many days and the return of exams to the entire class. In addition, testing center staff members are sometimes sick without replacement, which creates difficulties for the students with tight schedules who had planned to make up the exam during a specific testing time.

Scheduling patterns

While the number of students has increased, the number of students per class has remained fairly steady. Average class size for Biology courses at Rock Creek and Sylvania campuses is 29 students; at Cascade, 34 students.

To accommodate the increase in student enrollment without increasing class sizes, each campus has increased the number of sections of popular courses. This has had a significant impact on classroom and laboratory space needs. Classes with labs are now offered from 8 am to 10 pm, Mondays through Saturdays. While the number of available lab classrooms and lecture rooms has remained constant, the number of lab sections offered has increased at all campuses (see Figures 1-3), and we have added use of a lab room at SE Campus to support two popular lab courses. Laboratory space is now a limiting factor in the number of sections that can be offered at Sylvania, as all lab rooms are in use at all times throughout the week.

The lab schedules are frequently so saturated that the lab staff do not have adequate time to straighten up/restock in the ten minutes between consecutive sections. Further, many of the laboratory classes conduct practical exams. These require a few hours to set up, which can cause logistical difficulties when the few windows of availability in the lab room do not mesh with the schedule of the instructors who are setting them up.

Program strengths

Program Strengths: serving our students

Our principal strength is in the work we do to serve our students, first and foremost. We are meeting the high demand for biology classes, we are successfully providing prerequisites for health professional training programs, and we are providing biology classes to satisfy AAOT and other college transfer requirements. Faculty members are well-trained and have strong, diverse

backgrounds. In addition, innovative faculty members regularly obtain grants and facilitate student involvement in the community.

We conscientiously prepare our students for the 300-level and 400-level courses they will take at the 4-year colleges. For example, in our Principles of Biology courses, we spend a lot of time teaching students how to execute the scientific process, including how to write a scientific paper and how to use lab equipment (and general lab protocol) that will be useful in future courses at 4-year colleges and in the workplace.

Program strengths: contributions to the college mission

Despite stretched resources and energy, SAC members are involved in the life of the college and contribute in many ways. Ed DeGrauw served as the Curriculum Committee chair and as such is a member of the EAC. He is also a member of the negotiating team for the union. Linda Fergusson-Kolmes currently serves on the curriculum committee.

Many of us have also made a significant contribution to the college in the area of sustainability. April Fong, Linda Ferguson-Kolmes, Tom Robertson, Alexie McNerthney, and Kevin Lien have been leaders in this area and have participated in one or all of the following: the learning garden, PCC Sylvania Habitat Restoration Team, Green Team, waste audits, construction of a 365 water bottle display at Sylvania, Focus the Nation, The Great Container Challenge, Spring 2009 Environmental Film Series, Earth Day celebrations 2008-2009, Studienforum Germany Energy Policy conference, District-wide Climate Action Plan Forums, Green Academy of Sciences at PCC Sylvania 2008, and the Print Reduction Committee. The department and individuals won Sustainability awards and April Fong won an award associated with Community Watershed Stewardship Programs.

Another significant accomplishment was the creation of a biology lab at PCC's Southeast Center undertaken by Dr. Kate Richardson and lab technicians Cathie Cookus and Brett Schaerer. Previously Dr. Richardson shuttled microscopes, models, water bottles, spectrophotometers, and other equipment back and forth to Marshall High School. To make the Southeast Center lab a reality she worked with administrators to build an efficient and well-planned lab. From Fall 2006 through Spring 2008 Sylvania biology instructional support staff provided all of the lab support to the Southeast Center Bi 101 lab course. Cathie did all the research, quote acquisition, and orders for all of the set up to upgrade Southeast Center to be able to offer Bi 112 labs. Brett and Cathie set up the store room and stocked the modified lecture room and provided lab support for the first two weeks of Fall 2008. The Sylvania staff trained the Southeast lab support staff and still provides some support to the Southeast Campus and does all the ordering of supplies for their biology labs.

Program weaknesses, and recommendations for improvement

The primary weaknesses of the program that need to be addressed include the following: fully addressing all core outcomes, lack of space and other resources, high ratio of adjunct faculty to full-time faculty, inadequate student preparation upon entry into classes, lack of follow-up on student success, and lack of professional development funds.

Core Outcomes

While we did the work required for Core Outcomes assessment, we were not satisfied with the amount of data we collected to support our findings with regard to how well our students are meeting college core outcomes. In some cases, only a few classes were surveyed. It would be better to have a more systematic way of data collection and interpretation. Core outcome assessment over the past two years has been a project added to two other significant, time-consuming projects: the evaluation and rewriting of every CCOG for our 33 Biology courses to assure they meet General Education requirements, and the production of this program review. Coupled with the increase in student enrollment over the past two years, our workload has been heavy. Yet the annual number of SAC days and our teaching loads, of course, have stayed the same. We are hopeful that the next year will be free of “big projects” and we can devote much more time to assessing core outcomes.

Lack of Space and Other Resources

On all campuses, space is at a premium for classes offered by the biology departments. Classes are at capacity, storage space is inadequate, and office space allocation is frequently well below the standards set forth by the college for both part time and full time faculty. This situation is further compounded by the high enrollments of the department and increasing demands for biology courses by other programs such as allied health. Programs for which biology courses are prerequisites depend on the biology departments to offer sufficient numbers of sections to allow their students to complete these prerequisites in a timely manner so as to enter or continue in their program of study.

There is also a lack of facilities support for weekend classes. Buildings, libraries, and tech centers do not open early enough to support classes that start at 9 am or earlier. The limited hours for buildings on weekends make it hard for our weekend instructors to meet with students (they often need to be out of the building within 10 minutes of classes ending).

As discussed under program strengths, the biology departments have added sections; however, these sections have been added without adequate funding for additional equipment, supplies and technical support. Our equipment and resources are over-stretched, which compromises the students' learning experience. Laboratory preparation space is insufficient and poses safety risks for laboratory technicians, other staff, and faculty. Inadequate ventilation systems, storage facilities, and workspaces limit the safe use of dissection materials and may pose an increased

health risk to students and faculty involved in these laboratory activities. This issue will hopefully be addressed with the remodeling of lab spaces under the bond initiative.

Faculty preparatory and office spaces are also inadequate. It is impossible to meet FERPA requirements when discussions with students occur in instructors' open cubicles that serve as offices on the Rock Creek and Sylvania Campuses. With space at a premium and the large number of students seeking conversations with their instructors, there are not enough, if any, private spaces for all instructors to meet with students.

High Ratio of Part-time to Full-time Instructors

As noted earlier the high ratio of part-time to full time instructors continues to be one of the major weaknesses of our program. It is a continuing source of frustration that has a negative impact on the morale and effectiveness of all instructors.

Relying heavily on part-time instruction creates problems in several areas. First, quality control becomes an issue. Full time instructors do not have the time to supervise every part-time instructor and ensure that the quality of instruction, content, and class dynamics meet desired standards. Second, coordination between sections becomes more complicated as more part-time instructors are hired. Third, increasing the number of part-time instructors places additional pressure on the office and prep spaces available as well as taxing administrative resources. Finally, having a large cadre of part time instructors results in a high turnover among staff. This high turnover results in a higher demand on full time faculty to mentor new instructors and increased demand on human resources, payroll and departmental administrative staff.

Having such a high number of adjunct instructors diverts time away from department chair duties who must conduct assessments within the first two terms of hire, and again every three years. This results in a long list of required assessments each term. Also, with high turnover of adjunct faculty, department chairs must continually engage in seeking, interviewing and hiring new instructors to replace those who have left the college.

Given the relative size and importance of the Biology program, which accounts for 13.52 - 14.07% of all students enrolled for credit and 6.71 - 7.02% of the total FTE of all students enrolled in credit courses over the past three academic years, we feel justified in requesting additional administrative support in terms of hiring additional full-time faculty, plus funds for equipment and supplies as these monies become available.

Lack of Adequate Professional Development Funds

The previously inadequate level of funding for professional development is now woefully inadequate due to budget cuts. This hampers faculty from staying current in their field. Money available for attending conferences is often below the registration cost of most professional

meetings. Coupled with the cost of travel, lack of adequate funds for professional development prevents faculty for growing in their field.

Appendix A

Table 1. Course outcomes mapping matrix for all biology courses at Portland Community College. Rubric values are: 1= limited, 2 = minimal, 3 = sufficient, 4 = proficient

Course	College Core Outcome				
	Communication	Community and Environmental Responsibility	Critical Thinking and Problem Solving	Cultural Awareness	Self-Reflection
BI 101	3	3	2.5	2	2
BI 101H	3	3	3	1	2.5
BI 102	2.5	2	2.5	1	2
BI 103	3	1.5	2	1	1.5
BI 112	3	1.5	3	1	2
BI 121	3	0	2	1	1
BI 122	3	0	2	1	1
BI 141	2	3.5	3	2	2
BI 142	2	3.5	3	2	2
BI 143	2	3.5	3	2	2
BI 145	3	4	4	4	4
BI 160	3	3	2	2	4
BI 161	3	3	2	2	4
BI 163	4	4	3	3	4
BI 198	3	3	4	1.5	3.5
BI 200	3.5	3	3.5	1.5	3
BI 202	3	3	3	2.5	2.5

BI 211	3	2	3.5	1	3
BI 212	3.5	2	4	1	3
BI 213	4	3	4	1	3
BI 222	3.5	1.5	3.5	1.5	2.5
BI 231	3	2	3.5	1	2
BI 232	3	2.5	4	1	2
BI 233	3	2.5	4	1	2
BI 234	4	3	4	2	2
BI 241	4	3	3	4	4
BI 280	3	4	4	2	4
BI 287	2	2	2	2	3
BI 298	3	3	4	1.5	3.5

Table 2. Enrollments in Biological Sciences expressed in Full-Time Equivalency (FTE)

Full Time Equivalent (FTE) Enrollment	2006-2007	05-06 to 06-07	Percent Change 05-06 to 06-07	2007-2008	05-07 to 06-08	Percent Change 06-07 to 07-08	2008-2009	07-08 to 08-09	Percent Change 07-08 to 08-09
	Total	Change	%	Total	Change	%	Total	Change	%
College Wide	1,316.3	21.7	1.7	1,314.0	-2.4	-0.2	1,497.5	183.5	14.0
Sylvania	524.0	-7.7	-1.4	504.3	-19.7	-3.8	580.3	76.0	15.1
Cascade	429.5	13.0	3.1	416.2	-13.4	-3.1	471.8	55.7	13.4
Rock Creek	324.8	7.5	2.3	348.4	23.6	7.3	382.6	34.1	9.8
ELC	8.4	-	-	10.4	2.0	24.1	15.9	5.5	53.1

Table 3. Grade Distribution for students by campus, comparing all courses and specific biology courses for the academic year 2008-2009. Values are percentages of students earning corresponding grades.

Student population		Grade								
		N	A %	B %	C %	D %	P %	F/NP %	W %	Other/ Incomplete/ Audit %
Collegewide		10,488	30.7	29.2	18.1	5.2	0.6	5.8	8.2	2.2
Sylvania		4,248	31.6	28.3	17.0	5.6	0.6	7.9	6.7	2.3
Cascade		3,400	36.1	32.1	16.0	3.3	0.4	3.8	6.2	2.0
Rock Creek		2,730	27.9	28.1	20.4	6.4	0.4	6.6	7.4	2.8
Bi 231	Sylvania	674	27.2	22.3	16.8	8.0	0	15.1	7.9	2,8
	Cascade	709	29.8	32.9	18.2	3.2	0.3	5.2	7.2	3,2
	Rock Creek	428	30.4	24.3	18.2	7.9	0.5	6.3	7.9	4.4
Bi 232	Sylvania	482	28.4	27.2	17.2	8.3	0.4	9.5	5.8	3.1
	Cascade	533	34.9	34.1	16.5	2.8	0.2	2.6	6.6	2.3
	Rock Creek	283	25.1	29.3	23.0	10.2	0	4.9	6.7	0.7
Bi 233	Sylvania	334	30.2	35.0	16.8	6.3	0.3	3.9	5.1	2.4
	Cascade	459	42.9	34.2	14.8	1.3	0.4	1.1	3.7	1.5
	Rock Creek	180	34.4	28.3	21.1	3.3	0	2.2	3.3	7.2

Table 4. Biology students served by library orientations by campus, 2005 - 2009.

Academic year	Cascade	Rock Creek	Sylvania
'05-'06	629	0	845
'06-'07	433	0	971
'07-'08	535	111	524
'08-'09	576	0	465

Table 5. Staffing of the Sylvania Tutoring Center, Academic years 2007/2008 – 2008/2009.

Tutoring Staff	Total Hours worked 2007-2008	Total Hours worked 2008-2009
Student help	850	587
Part-time instructor	484	484