William Paterson University
Spring 2010, Issue 1

Th'Ink Well

Quarterly Newsletter from the Center for Teaching Excellence

Inside this issue:

Undergraduate Research

A High Impact Educational Practice

Research suggests that the most important predictor of students' learning and development is the time and effort they devote to educationally purposeful activities. Internships, service learning, capstone experiences, and research projects with faculty are educational practices that significantly affect student success. These "high impact" activities affect positively all types of students and notably benefit first-generation college-going students (who are part of our community).

High impact educational practices ensure high levels of active and collaborative learning for students. They are effective with students for several reasons:

- They require students to devote additional time and effort and reinforce their commitment to their academic program.
- They require students to interact with faculty and peers about substantive issues over prolonged periods.
- They require supervisors to provide students with prompt and frequent feedback about their performance.
- They provide students with opportunities to integrate and apply knowledge in diverse settings, on or off campus.

We are devoting this issue to examining undergraduate research experiences at WPU. Results from the 2008 National Survey of Student Engagement will shed light on campus trends. Faculty and students will share insights about current undergraduate research efforts and ways to enrich our educational environment. We hope you enjoy it!

The **U.S. News & World Report** "**Best Colleges 2010**" ranks schools in fifteen areas related to academic excellence. One of their rankings, "**Undergraduate research/Creative projects**," places particular emphasis on students' research and creative work mentored by faculty.

The **2010 report classifies WPUNJ** as a *less selective, Tier 3, master's university*. Only two *Tier 3* institutions rank among the best fifty colleges in undergraduate research and creative projects,

- University of North Carolina—Asheville, *a liberal arts college with under 4,000 students*
- University of Maryland—Baltimore County *a public national university with 9,612 students*

Among the **50 colleges ranking at the top** in the area of "Undergraduate research/Creative projects" were,

- 48 *Tier 1* institutions & 2 *Tier 3* institutions
- 17 *public* & 33 *private* institutions
- 49 *most* or *more* selective institutions
- 19 *Liberal Arts* & 1 *Baccalaureate* colleges
- 25 *National* universities,
- 5 *University-Master's* institutions

Source: U.S. News & World Report (2010, February 28). *Best Colleges: Undergraduate research/Creative projects*. Retrieved from http:/colleges.usnews.rankingsandreviews.com/best-colleges/undergrad-research-programs

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We are located in Cheng Library, Room 203.
Please visit our website: http://www.wpunj.edu/academics/cte

Student Participation in Enriching Educational Experiences

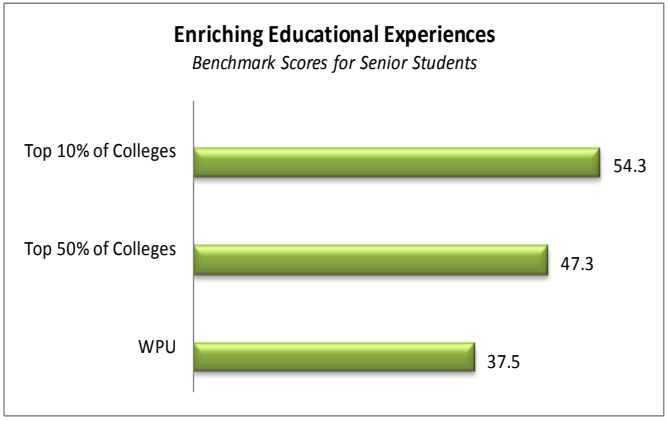
Findings from the National Survey of Student Engagement

William Paterson University has participated four times in the National Survey of Student Engagement (NSSE) since 2000. * This survey is administered each Spring to a random sample of undergraduate first-year and senior students in many U.S. four-year colleges and universities. The survey questions tap into important aspects of the student experience and educational practices that contribute to student engagement and success.

The NSSE results reported by the Office of Institutional Research and Assessment at WPU suggest how students perceive our educational environment and place these findings in a broader context. It provides results for comparison groups, including public *regional* colleges and universities (Group I), colleges and universities in our Carnegie classification [Master's] (Group II) and an augmented peer group (Group III).

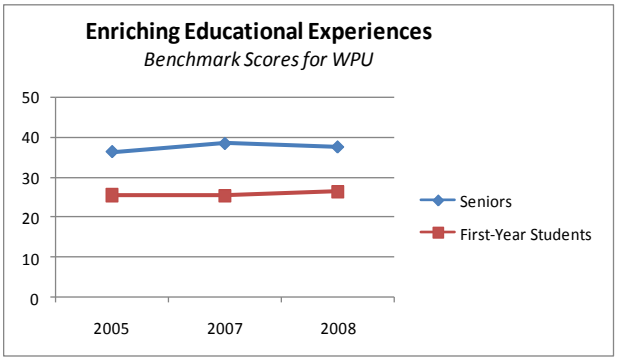
Most recent NSSE outcomes in the areas of "enriching educational experiences" and "student-faculty interaction," reveal the following patterns :

- Seniors at WPU and its peer institutions perceive a **less enriching educational environment than** students attending the **top 50%** of all **NSSE schools**.
- Seniors at WPU and its peer institutions report having **less interactions with faculty than** students attending the **top 50%** of all **NSSE schools**.



* Faculty may access the 2008 NSSE Reports via WPConnect at http://ww2.wpunj.edu/ira/wpconnect/NSSE/08.htm

- WPU seniors report having an **enriching educational experiences comparable to** those of students attending in **peer institutions**.
- WPU seniors report **interacting with faculty at levels comparable to** those of students attending **peer institutions.**
- WPU **seniors** report **more enriching educational experiences than first-year students at levels comparable with** those of students attending **peer institutions**.



- WPU **seniors (like the seniors in all peer groups)** were **less positive than first-year students about** experiencing a **supportive campus environment**.

Notwithstanding above mentioned similarities,

⇒ WPU seniors report ***discussing grades and assignments with faculty more*** than students attending peer institutions.

⇒ WPU seniors report ***participating less in research projects with faculty*** than students attending peer institutions.

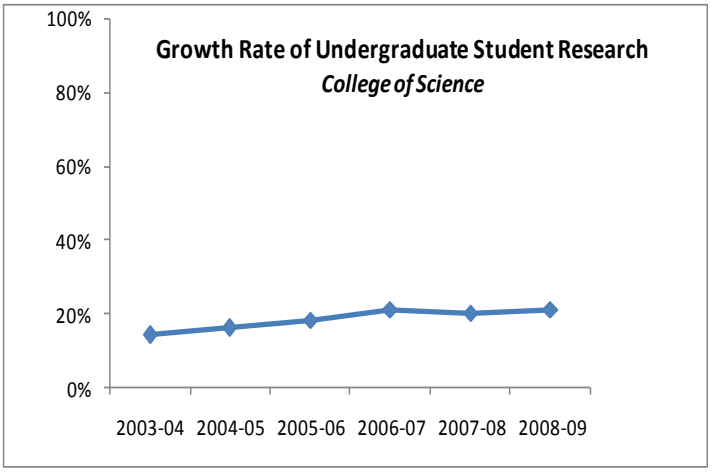
⇒ Seniors at WPU report ***participating at higher rates in capstone courses and at lower rates in internships*** than students attending peer institutions.

⇒ Seniors at WPU report ***working with classmates outside of class less often*** than seniors attending peer institutions.

The Student Undergraduate Research Program

Pradeep Patnaik, Professor of Biology & Coordinator of the SURP Program

Undergraduate involvement in research is increasing across the campus. This is especially true for the School of Science and Health where student participation in empirical research in their classes, via Independent Studies or in faculty-directed research during the summer has increased from 11% of majors in 2000-2001 to 21% of majors in 2008-2009 (please see page 14 from the 2008-2009 Excellence & Accountability Report). The work of some of these students is published in refereed journals and many present their findings at national or international meetings. In fact, students from the department of Biology have been especially successful at winning awards for their presentations at a major National Institutes of Health (NIH)-sponsored symposium of undergraduate research organized by the University of Maryland in Baltimore. This symposium, now in its 11th year, draws greater than 400 participants from universities along the northeast corridor and some from far beyond.



Encouraged by examples of student engagement and excitement in competing at the Baltimore symposium, *Dr Jaishri Menon* and *Dr Jean Fuller – Stanley* as well as others from the Biology Department as well as the Dean's office now organize a similar conference at WPU. Such a meeting fosters productive discussions among participants – many of whom are working under similar constraints, promotes a healthy sense of competition, and provides a platform to showcase student achievement. The Third Annual Research Symposium, held in April 2009, attracted 115 participants to our campus from 11 institutions in the tri-state area.

The Student Undergraduate Research Program (SURP) was created to encourage student involvement in research. Students develop research proposals under faculty guidance that are evaluated by a committee, which then recommends funding (up to $2000 per proposal for supplies and expenses) or offers suggestions for improvement and resubmission. SURP has seen strong participation from the Departments of Biology, Computer Science and Music over the past few years and undergraduate research programs in these departments could serve as institutional models. Students have utilized these funds for a range of studies (that of Masaai drums and a Luo string instrument in Kenya, performance and efficiency of digital signal processing in specialized computer applications, molecular mechanisms controlling DNA replication in a parasitic protozoa, etc.). Some of this research has resulted in peer-reviewed publications or, where appropriate, in public performances or presentations (for example music student *Theodore Metz*'s recent study and subsequent performance and presentation of the work by the composer Christopher Tignor).

To gain committee approval for SURP funds it is not sufficient to simply ask an interesting question – topical and important as it may be. Most of these questions are likely to have been studied before – and the committee is looking to see if the student demonstrates a familiarity with preexisting literature on the subject, has identified a new or unusual angle to study and is proposing to pursue it with a certain degree of rigor.

SURP application forms can be accessed online. Simply go the University Web page and type SURP in the search box. The committee overseeing this program meets twice a year following the two application deadlines – one in March and the other in October.

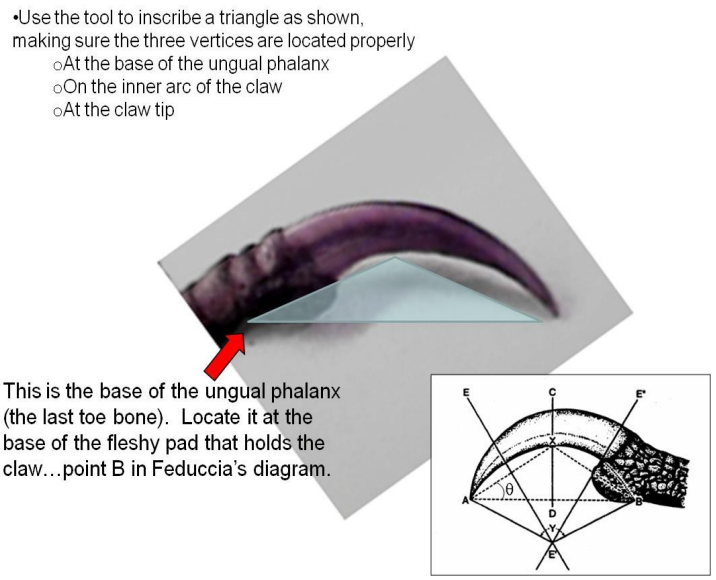
Faculty Voices * *Practicing Real Science in Undergraduate Courses*

Research-Based Online Laboratory Exercises for Non-Majors in BIO 130 Field Biology

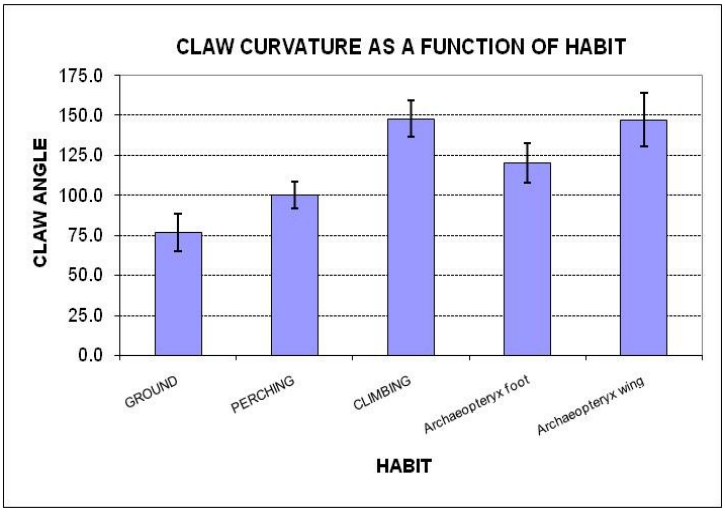
Steve Vail, Professor of Biology

My colleagues and I in the Department of Biology have developed a number of laboratory exercises involving non-major students in the collection, analysis, and interpretation of data to test non-trivial hypotheses in ecology and evolutionary biology. Four of these exercises have been adapted for use online, and were used successfully in that setting in Summer 2009. Our most important conclusion is that non-major students can be involved in and excited by the practice of real science, as opposed to simulated science, in the confines of a teaching exercise. Careful selection of a vivid hypothesis, a stark experimental comparison, and simple methods eliminate the need to simplify anything essential about the research. In most cases we have based our exercises on exceptionally elegant published research articles that epitomize these qualities. In most cases we developed our exercises for majors and used them successfully before adapting them with little trouble to use in our non-major class. The major accommodations are more careful introductory instruction and automating of statistical computations. Beyond the intrinsic interest of their content, these exercises demonstrate to students that the essence of science is hypothesis testing, that simple methods often suffice, and that clarity and elegance are hallmarks of excellent science. That all of this applies to evolutionary biology as much as to any other science is of special interest and concern to us.

1.Evolution of Flying Birds. *Archaeopteryx lithographica* is an extinct early bird with a mixture of reptilian and avian features. It has long served as the focus of a debate about the evolution of bird flight, between those who propose that early birds were climbers and gliders and those who propose that they were runners and leapers. Following Feduccia (1993), students measure the claws of birds in our WPUNJ collection, statistically compare the values for running birds and climbing/perching birds, and use the result to draw a conclusion about the behavior of *Archaeopteryx*, using measurements of *Archeaopteryx* claws (published values or measurements of photographs available online).



We provide the students with enlarged photographs of claws from our collection and they work with tracing paper and protractors to take the measurements. For online use, the claw photographs can be measured onscreen using standard tools of Microsoft PowerPoint. We guide the students through a simple statistical analysis using Excel. The measurements reliably reproduce Feduccia's result supporting the conclusion that *Archaeopteryx* was a climbing/perching bird and a "trees-down" scenario for the evolution of flying birds.



Faculty Voices * *Practicing Real Science in Undergraduate Courses*

Research-Based Online Laboratory Exercises for Non-Majors in BIO 130 Field Biology

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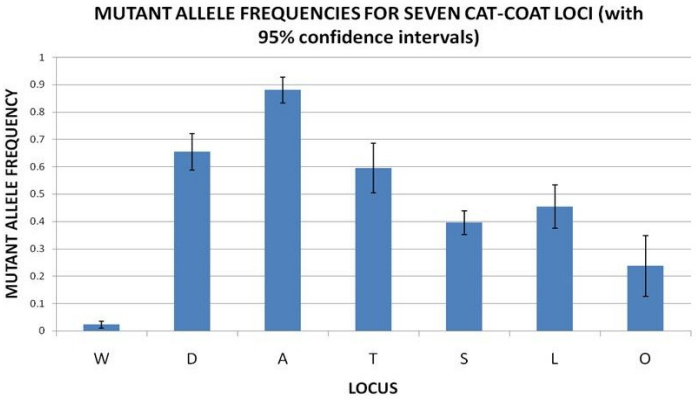
2. Population Genetics and Evolution of the Domestic Cat. Students learn to recognize alternative genotypes for each of seven genes controlling the coat characteristics of cats. For example, one gene determines whether a cat is striped or solid, another determines whether or not it is orange, and another determines whether it has white patches. It takes one lab period to learn the genetics and practice identifying genotypes. Students then visit animal shelters, record cat genotypes and (during a second lab period) compute gene frequencies and compare their results to published results from cat populations around the world. Almost all animal shelters now have cat photographs on their web sites, so collecting data online is an option. The resulting genetic profile reflects our cat population's history of migration and evolutionary change, and differs from that of cat populations elsewhere. Students develop hypotheses to explain the patterns they see using principles of evolutionary biology.



3. Origin of Whales. Following Gatesy et al. (1999), students use DNA sequence data from a national database to reconstruct the evolutionary relationships of whales. Students search the database, download appropriate sequence data for various species, and use the same software used by professionals to construct an evolutionary tree showing the ancestry of whales among the even-toed hoofed animals

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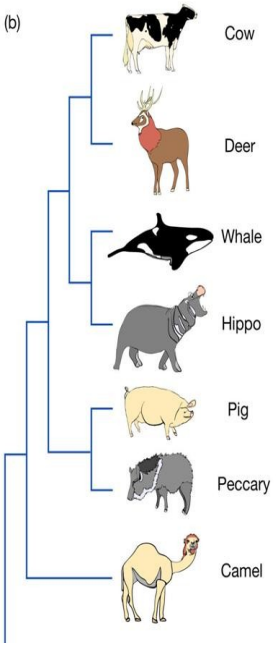
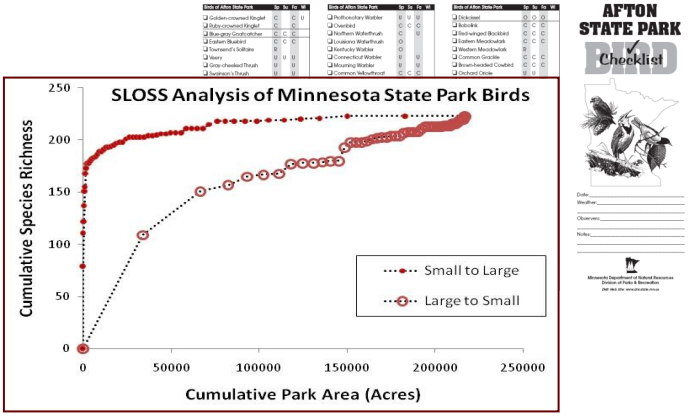


4. Species-Area Relationships and the Design of Nature Reserves. Following Quinn and Harrison (1988), students do a graphical analysis of the relationship between habitat area and number of resident bird species, using park data and bird checklists available on the web (for the Minnesota State Park system). They use the analysis to address a long-standing question as to whether you can conserve more diversity with a few large parks or a large number of smaller parks, and use this as a basis for discussion of conservation and the design of nature reserves.



Student Voices* *My Undergraduate Research Experience*

Carrie A. Logerfo, *WPUNJ Alumni*

I started my work in research as an undergraduate psychology major at WPU. During that experience, I worked closely with my mentor and other undergraduate students. What nurtured my desire to continue doing research the most was the opportunity to read research articles from journals. At the beginning of each semester, before we did any practical applications, my mentor would give us 3-5 articles to read that pertained to the area we were about to research. We would read the articles individually and make note of interesting findings and questions we thought of while reading them. Then we would meet during common hour and discuss them together. The ability to read a research article is not easy to acquire. It takes both time and patience. This practice definitely helped me to better understand the area we were studying and to be the best researcher I could be when working directly with the participants.

Shannon Mayer, *Psychology Major*

As an undergraduate student, being involved in research has been possibly the best experience of my college career. Not only has it taught me skills that one would not typically learn in a statistical methods class, but the experience will be beneficial for me in my future endeavors as a graduate student and researcher. As a student, it is important to form relationships among those who share the same interests as you. Being in the research lab has allowed me to form these relationships and expand my networks. It has given me the privilege of getting to know professors on a more personal level, rather than developing a typical student-teacher relationship. Most university classes are large and impersonal, but research labs have a smaller ratio of students to professors. This allows students to have more one-on-one time with their professor. From my experience, professors take a special interest in the students doing research. They get to know them personally and are willing to go out of their way to help them succeed.

Jennifer Johnson, *Biology Major*

As an undergraduate at William Paterson University, with aspirations of eventually attending graduate school, I never knew the importance of being involved in research. It is a lesson I learned after I graduated. It was then that I realized that my application was not strong enough to classify me as a competitive applicant for any PhD program. After graduating in May 2009, I decided to quit my dead-end job and focus on getting accepted into a graduate program starting in Fall 2010. I have grown more as a student and researcher in these past few months than I did throughout my undergraduate career. I have been challenged to think critically and independently, two valuable characteristics that are the main ingredients in the recipe for success. There is no doubt in my mind that my involvement in research has been the catalyst in my journey toward graduate school acceptance. If I could offer any advice to the undergraduate population, it would be to get involved in research as soon as possible, for it is not only exciting but a rewarding experience.

Leah Riza Viray, *Psychology Major*

A year ago, I had no clear direction about my academic plans. I was undecided on a research topic. I had no knowledge of the research process. I asked other students for advice about undergraduate research projects. Although they provided a summarized view of the process, I struggled to find my "niche." In a way, I was a driver sitting in my car with no clear destination. I found myself scratching my head, until I encountered a mentor. With a mentor, I finally found direction. I realized that there were several smaller roads to take before I reached the highway called "undergraduate research." I was taught how to organize my ideas. I was familiarized with the research process. I was given sources, suggestions, and full support. I received critique—both positive and negative. Thanks to my mentor, I was now acquainted with the roads to my destination. I was finally an experienced driver choosing my own route.

Faculty Spotlight

Presenters from CTE Seminar on Potential for Technology in the Classroom, 12/10/2009

Jennifer Callanan
Environmental Science

Dr. Jennifer Callanan is an assistant professor in the Department of Environmental Science. She earned her BS (2001) and MS (2005) degrees in Geoscience and her Doctor of Environmental Management degree (2008) from Montclair State University. Dr. Callanan joined the faculty of William Paterson University in 2008. She teaches courses in both earth and environmental science. Her research focuses on soil formation as influenced by forest fires.

Michelle Kowalsky
Educational Leadership

Dr. Michelle Kowalsky is an assistant professor in the Department of Educational Leadership & Professional Studies. Her expertise is in technologies for learning and libraries. She is the coordinator of the graduate school library media specialist programs, and is currently supervising thesis work for students pursuing their M.Ed. in Curriculum and Learning.

Center for Teaching Excellence Calendar

Spring Seminars

Date	Seminar Title	Location/Time
Thursday, April 1st	*Teaching Unprepared Students: Success & Retention Strategies*	Paterson Room, 12:00-1:30 p.m. **Special Online Seminar**
Thursday, April 22	*How to Lie with Graphs: A Way to Teach Critical Thinking*	Paterson Room, 12:30-1:45 p.m.
Tuesday, May 4	*Enriching Educational Practices: Undergraduate Research*	Paterson Room, 12:30-1:45 p.m.