Challenges for Early Career Faculty
The Council on Undergraduate Research Quarterly is published in September, December, March, and June by the Council on Undergraduate Research. Articles, news items, letters, and information on funding sources are welcome. Submission guidelines are printed in each Quarterly issue.

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The CUR Quarterly serves as the official public “voice” of CUR to both its members and to a broader community. Its purpose is to provide useful and inspiring information about student and faculty research in primarily undergraduate institutions. The goal and function is to advance the mission of CUR. To this end, the operations and editorial policies of the CUR Quarterly should be flexible so that its content and deadlines meet the immediate needs of the communities that it serves.

CUR Quarterly
Volume 29, Number 1

Length of Articles —
2000–3000 words should be a general target for the length of the article, but longer or shorter articles may be appropriate for the treatment of certain topics. Hard copy of any photograph or art must be submitted with your article along with accompanying captions. Please identify each person in each photograph.

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If your article is accepted for publication, our editors will provide you with instructions for submitting your final set of materials. These should include your electronic files, and any associated photos, art, or electronically stored images.

Please submit manuscripts with minimal formatting. No double spacing, no paragraph indents, and no hard returns at the ended lines. In general, all formatting needs to be removed from word processing files before they are composed for this publication. If you need to indicate words in italics, omit something in bold, or to format a table, please do so. That is all of the formatting you will need to provide. We will take care of the rest. But please remember to run an electronic spelling and grammar check.

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Files can be accepted as an email attachment and should be emailed directly to the editors along with captions.

Compatible Formats —
Generally, all text file formats are acceptable, although Microsoft Word is preferred. Image file formats (EPS, TIF, JPG, GIF) are accepted. Resolution must be 300 dpi or greater at the size the image is to be used. You may also submit original color or black and white photographs, or line art. Art generated in drawing programs [Illustrator, Freehand, CorelDraw] and exported in any of formats mentioned above is acceptable. Please note that images obtained with many digital cameras do not have sufficient resolution for use in the Quarterly.

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The CUR Quarterly will consider letters from readers for publication. We are especially interested in your responses to “CUR Comment” pieces. Letters to the Editor should be limited to 250 words, and must be on topics relevant to CUR’s mission. They must be signed (electronic versions must be followed by hardcopy). Letters will be edited if necessary and the writer will be shown the edited version for her/his approval. Letters will be published at the sole discretion of the Editors. They should be submitted to:

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### SUBMISSION Guidelines

#### General Criteria
- Articles addressing how to initiate, support, or sustain research are appropriate for this journal. This publication is not the appropriate venue for publishing results of undergraduate research.
- News items or articles describing funding sources or programs should address specific benefits provided and eligibility requirements, with information about criteria for judging competitive projects when available.

#### Editorial Policies
- The CUR Quarterly is the voice of members of the Council on Undergraduate Research. Editorial judgment regarding publication of manuscripts and letters rests with the Editors. Concerns about editorial policies and decisions should be addressed to the Editors. Acceptance of photos will be based on appropriateness, quality, space available, and completeness of information provided. Photographs will be returned if you so request.

#### How to Submit
- Articles should be submitted for review to the Editor-in-Chief. Authors are encouraged to discuss disciplinary articles with the appropriate Division Editor prior to submission. Articles should be submitted initially as an email attachment. Copies of corresponding images also may be included. Contact information for all Editors is listed at the front of every issue of the Quarterly.

#### What to Include —
- Copy of article
- Original photos and illustrations.
- Captions for photos and figures. Identify people in photos.
- Personal information — Institutional titles for all authors (for inclusion in Editor’s Notes).
- Biographical Data
- Complete mailing and email addresses and fax Nos for all authors.
- Key words for indexing.
- Proper Citations (CUR Quarterly-Citing Guidelines)

#### How and When to Submit
- Letters to the Editor should be limited to 250 words, and must be on topics relevant to CUR’s mission. They must be signed (electronic versions must be followed by hardcopy). Letters will be edited if necessary and the writer will be shown the edited version for her/his approval. Letters will be published at the sole discretion of the Editors. They should be submitted to:

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CUR was recently awarded a Course, Curriculum, Laboratory Improvement grant in the amount $499,066 from the National Science Foundation. CCLI activities include eight regional workshops over the next two years and follow-up activities for institutions that participate in the regional workshops. The purpose of the grant is to assist campuses to make institution-level change to establish, formalize and expand undergraduate research opportunities. These workshops will be directed toward campuses that have not yet institutionalized undergraduate research. Five Regional Workshops have taken place already and the remaining dates include:

**Northeast**
Buffalo State College, September 26-28, 2008
Application Deadline: August 15, 2008

**Great Lakes**
Hope College, October 10-12, 2008
Application Deadline: September 1, 2008

**Central**
Truman State University, October 24-26, 2008
Application Deadline: September 15, 2008

Please visit [https://www.cur.org/ccli.html](https://www.cur.org/ccli.html) for more details and for workshop applications.
April 2008

15  Early registration deadline for the 2008 CUR National Conference

25  Deadline for submitting application for Institutionalizing Undergraduate Research Institute, Malaspina University-College, Nanaimo, BC, Canada

30  2008 Posters on the Hill

May 2008

1  Deadline for submitting application for Beginning a Research Program in the Natural Sciences at a Predominantly Undergraduate Institution
Deadline for submitting application for the Proposal Writing Institute
Deadline for submitting application for the Social Sciences Institute

June 2008

5-7  CUR Institute “Institutionalizing Undergraduate Research,” Malaspina University-College, Nanaimo, BC, Canada

6-8  New CUR Institute! “Beginning a Research Program in the Natural Sciences at Undergraduate Institutions” Davidson College, Davidson, NC

20-21  CUR Annual Business Meeting, College of Saint Benedict, Saint Joseph, MN


July 2008

18-20  Social Sciences Institute – Carthage College, Kenosha, WI

20-24  Proposal Writing Institute – Baldwin-Wallace College, Berea, OH
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Several years ago I participated in a Harvard Institute for academic administrators. One of the plenary sessions was about mentoring. When the speaker concluded his remarks, one brave soul in the audience raised her hand and said, “I never had a mentor and I wonder how many others were in that situation?” Several hands were slowly and somewhat reluctantly raised. During my career as a faculty member and as a beginning administrator, I never had a mentor either. I think those of us who had not been mentored felt left out, as if we had not been chosen to move ahead in our careers. Someone else asked, “How do I get a mentor? Do I just ask someone to mentor me or do I wait until someone offers to be a mentor?” That evening several of us discussed the role of a mentor and the ways in which we learned how to do our jobs. We discovered that, while we did not have someone who was clearly identified in the role of mentor, we, in fact, mentored in a variety of ways. Some of us, of course, read books about teaching, learning or leadership. We found books that talked about teaching or leadership in personal ways particularly helpful. One of our favorites was A Life in School: What the Teacher Learned by Jane Tompkins who wrote about her experiences trying to introduce more experiential learning into her English classes. Later in my career, I found that Ronald Heifetz’ book, Leadership without Easy Answers especially helpful as I faced some of the difficult decisions of a college presidency. We also discovered that we observed colleagues we thought of as successful and tried to learn what made them successful. Sometimes we talked with them about their career paths and the decisions they made. These people were mentors even though they did not have that official designation. As college president, I picked out my own mentor and simply called him for advice when I had an issue where I needed an outside perspective. Our conclusion was that mentoring occurs in many different ways and that we can seek it out in the way that best fits our own personality and needs.

In recent years, more attention has been paid to the importance of professional development and mentoring for faculty, especially in pedagogy and effective teaching strategies. Many doctoral-granting institutions participate in the Association of American Colleges and Universities/Council of Graduate Schools Preparing Future Faculty Program (PFF). The PFF program offers professional development for doctoral students and post-doctoral scholars to better prepare them for all aspects of the academic career: teaching, research, and service. Many early-career faculty have benefited from the support they received in developing their teaching skills, learning how to put a syllabus together, and how to design tests and other ways to evaluate student work.

CUR’s mission is to support and promote high quality undergraduate student-faculty collaborative research and scholarship. We do this through the various institutes, workshops, our publications and a range of other services. CUR members are very generous with their time and expertise and often serve as informal mentors to read funding proposals, discuss how to involve students in research, how to establish a campus research and scholarship symposium and many other supportive activities. This current issue of the CUR Quarterly includes several articles that can be very helpful to early-career faculty. The new institute for new faculty to be offered this June at Davidson College will provide another venue for professional development. The institute was developed by Merle Schuh and is an excellent example of one way in which experienced faculty share what they have learned about teaching, learning, and undergraduate research.

In addition to providing professional development opportunities for faculty, CUR also provides development opportunities for institutions. When faculty are able to successfully engage undergraduate students in research and scholarship, student learning is enhanced and the institution benefits through better retention rates, opportunities to recruit top students, and a more positive intellectual campus environment. With increasing public attention to the value of higher education, undergraduate research is an effective way of both enhancing student learning and communicating the results of that learning to legislators, parents and the public at large.

From the Executive Officer

Nancy Hensel
CUR National Office
The focus in this CUR Quarterly issue on professional strategies aimed at junior faculty coincides with a variety of current initiatives within the Council on Undergraduate Research. We all recognize CUR’s focus on faculty development, with our programs and services particularly aimed at improving student learning through collaborative research and intended for faculty members at all stages of their careers. The expertise and dedication of CUR members enable the organization to provide the support and assistance that individuals need to advance their undergraduate research activities and develop their campus research culture. This collection of articles from experts at all levels—from new faculty members to veteran academic administrators—is one prime example of the assistance that CUR provides for its members. Even senior faculty members will find the advice offered to be incredibly valuable. The changing responsibilities of faculty members as they advance in the professoriate lead to new day-to-day challenges, and we can all benefit from the perspectives and solutions suggested by others.

The advice and strategies presented by this issue’s authors constitute a “toolkit” that many of us did not have as beginning faculty members. CUR is dedicated to providing an expanding menu of new resources for early-career faculty. As one example in an array of services, CUR is pleased to announce the inaugural offering of an institute geared toward new faculty: “Beginning a Research Program in the Natural Sciences at a Predominantly Undergraduate Institution.” The objective of this institute is to give pre-tenured faculty members (particularly those in their first three years of appointment) the opportunity to learn from and discuss with experienced faculty how to establish and manage a research program with undergraduates. Graduate students and post-doctoral associates who are interested in pursuing academic careers at predominantly undergraduate institutions are also welcome to attend. A range of topics will be covered during the institute including recommendations on how to: select and design research projects appropriate for undergraduates, identify and recruit undergraduate researchers, mentor undergraduates and develop their research skills, connect research interests and findings to the classroom, and develop grantsmanship skills related to gaining external and institutional research support. CUR recognizes that the local environment will certainly influence how a new faculty member designs a research program and involves undergraduates. Nevertheless, there are numerous experiences of more established faculty that can inform new faculty members and enable them to become more effective members of the professoriate at an earlier stage in their careers. This professional development workshop aims to share such practical and strategic advice of experienced research-active faculty to enhance the research productivity of new faculty members.

In order to maximize the value of the institute, the target audience will consist of faculty with common needs and who are members of the Departments of Biology, Chemistry, Geology, Mathematics, Psychology, Physics and Engineering. Facilitators will be experienced, research-active primarily undergraduate institution (PUI) faculty members in these disciplines who will work individually with participants to help new and prospective faculty establish the goals for their research programs and develop a strategy and timetable to achieve their goals. The format of the institute will include both plenary and breakout sessions for individual consultations with facilitators. This two-and-a-half day workshop will take place between June 6–8, 2008 at Davidson College in Davidson, NC. More information about the institute as well as application instructions can be found at http://www.cur.org/institutes/newfaculty.html. Questions regarding the institute can be directed to the CUR National Office at cur@cur.org.

An additional point made in several of this issue’s contributions focuses on the role of a mentor. We all know that both formal and informal mentoring practices that provide access to information and resources are effective in promoting career advancement. The need for mentoring in the professional lives of graduate students, postdoctoral associates, and new faculty members cannot be underscored. This is especially important for faculty at small institutions where the guidance of more senior faculty members, or faculty members in one’s area of research, is not available. It is also critical for graduate students and postdoctoral associates who are considering a career at a PUI whose current advisors may have little knowledge of these types of institutions. While mentoring is traditionally viewed as essential early in one’s career, many faculty members could benefit from strategies that enable them to generate new research ideas, create time for research, establish successful collaborations, and maintain their level of expertise as well as enthusiasm. The advice of experienced mentors would be valued resources to assist all faculty members—prospective, new, and established—in achieving their career goals.

Several of CUR’s divisions have active mentoring networks. CUR mentors provide assistance in a variety of ways. For example, new or established faculty members can obtain advice on: the types of projects that are often successful in undergraduate environments, professional development goals, preparing tenure and promotion dossiers, appropriate funding agencies for research ideas, preliminary grant proposals, selection of external reviewers for grant proposals or manuscripts, or successful strategies for managing undergraduate research students. Graduate students or postdoctoral fellows can also obtain valuable information in a number of areas, for example: advice concerning the job application process and timing; review of job application materials, including cover letter, vita, teaching and research descriptions; or consultation about choosing a career at a PUI.

The success of these services relies on the willingness of CUR members from all disciplines and all types of institutions to serve in this capacity. Please share your expertise and become more involved in the organization by contacting your division chair to indicate your interest in serving as a mentor. And, please, particularly as you hire new colleagues for the coming academic year, encourage them to seek both internal and external mentors, with the latter role fulfilled through CUR. Participation in such mentoring activities will not only benefit the individuals involved but also enrich all of our institutions and the undergraduate research enterprise in general.
Research Collaboration as an Effective Avenue to Promotion and Tenure

Many of us can identify with the challenges of starting new jobs as assistant professors, fresh from our PhD programs. The first year, especially, can be overwhelming for those who haven’t spent much time teaching (aside from lecturer or teaching assistant experiences during graduate school). The demands on an assistant professor’s time are, of course, intense, but perhaps the biggest difference in the transition from graduate school to full time teaching and research is the addition of numerous other responsibilities. New faculty typically find themselves teaching three or four courses instead of one, advising students, serving on committees, preparing new courses, etc., in addition to maintaining an active research program. A frequent problem for junior faculty is spending most of their available time on teaching and service projects while neglecting scholarship. The daily demands of teaching seem pressing and immediate, so scholarship tends to be put off for later. A few years later, however, some junior faculty will lack scholarship, which may lead to a failure to receive tenure and promotion in spite of good teaching and service records.

Based on our experience, we feel that collaborative research is perhaps one of the most effective ways to maintain a high level of research activity given the additional demands placed on the new assistant professor. Most research projects in the sciences cannot be carried out by one person, which runs contrary to the stereotype of the lone scientist toiling away in isolation. A collaborative effort is needed to bring most research programs to fruition. Research collaborations have certainly increased over the years for a number of reasons, such as granting agency requests for collaborative projects, increased efficiency of research teams over individuals, etc. (Barnett, Ault, & Kaserman, 1988; Bozeman & Corely, 2004; Cutting, 2007; Wuchty, Jones, & Uzzi, 2007). Perhaps one of the most consistent reasons across disciplines is the substantial decrease in communication costs, but other issues identified are the complexity of projects, costs, and levels of specialization required (Wuchty, et al., 2007).

We believe that one of the biggest factors contributing to our promotions to Associate Professor at our respective institutions was our collaborative research effort. We began this effort many years ago (1997) as new assistant professors at a two-year state college that had a heavy teaching load (five courses per semester). Our program of research involved testing participants on perceptual tasks. It could often take months to collect the data because the data from each participant took about 45 minutes of testing, so spreading the testing effort between us greatly facilitated the data collection. Both of us knew that it would be very difficult to carry out such a research project unless we collaborated and divided the data collection between us. As the years went on, we found ourselves at different institutions, hundreds of miles apart. We continued collaborating on the design of new experiments and eventually published five manuscripts together as co-authors. Our collaboration has been ongoing for the past 10 years, with 8 of those years being at separate institutions. Both of us (and more so for the second author where there are fewer psychology faculty) also find that collaboration helps us maintain our specialization. There are no other researchers studying perceptual psychology at our respective institutions.

Prior to developing the collaboration, the first author spent approximately three to four years publishing works from graduate school. At that point, no new projects were being initiated though there were plans to do so. Mainly, it was a question of finding the time. Perhaps having someone else to work with was also a motivating factor for keeping a research program moving forward. The first author did have some collaborative research experience in graduate school. This group of graduate students tested a hypothesis about the quality of subject pools across the semester. This was an enjoyable project to work on and actually resulted in the first author’s first publication (Langston, Ohnesorge, Kruley, & Haase, 1994). Perhaps this early success made it easier to realize that collaborations could be an effective tool. The first author approached the idea of collaboration with the second author without any hesitation or questioning of whether it might work or not. As mentioned, without our collaboration we may not have been able to get a program of research “off the ground” so to speak, especially with our high teaching demands.

As the first author took a new position hundreds of miles away, our collaborations remained strong. It was during this time period that we published our first article together. It is difficult to arrive at a general conclusion about collaboration pluses and minuses without interviewing other people, but we worked well together in terms of exchanging drafts of manuscripts via email and working on them in a reasonably expeditious fashion. During this time, the second author...
also accepted a new position at a four year institution. He continued with the data collection portions of the study at the new institution, as well as work directed towards new research topics. The first author at that time was working as researcher on an altogether different project. Several years later, the first author returned to being an Assistant Professor and additional collaborative projects developed between us.

Research collaboration may provide a helpful way to transition from large, research-focused universities to smaller, teaching-focused institutions that typically have limited resources. The second author went to graduate school at one of the largest biomedical research universities in the South. This environment was flush with funding and equipment for neurobiological research (graduate studies) and biomedical research (postdoctoral fellowships). The move to a teaching-focused job at a community college was a challenge in regard to scholarship. The key problem was a lack of resources. Conducting neurobiology research at a community college was simply impossible without the proper equipment, facilities, and funding. We had tightly controlled photocopying privileges and very limited funding for research equipment due to budget restrictions. It was apparent that any scholarly efforts would require a major shift in research focus. The collaboration provided a good avenue for making this switch from neurobiological research to experimental psychology. The collaborative effort was essential to learning how to collect data with limited equipment (see below). In addition, the research collaboration facilitated the transition into a new field of scholarship. Sometimes junior faculty members encounter difficulty in conducting research, claiming “I simply cannot do my research due to a lack of equipment.” This problem is very real, particularly in the sciences. Our experience shows, however, that this problem can be overcome through a collaborative approach to research projects. Prior experiences, as mentioned above, are also a factor in these transitions. It probably helped the first author in his transition to being an assistant professor having conducted similar studies on his dissertation, also on a limited budget without extramural funding, and with limited time due to teaching responsibilities.

We have also been fortunate to be in environments where students are highly involved in research. Many students over the years have assisted us on important aspects of our projects including data collection and analysis, presentations at conferences, publication of results, and conceptualizing future research studies. This is certainly another important aspect of collaboration—the mentoring process (Bozeman & Corley, 2004). It is interesting to observe how collaboration is especially beneficial at small or medium sized institutions such as the ones where we work. From the first author’s own experience as an undergraduate at a very large institution, it was very difficult to get involved with faculty on research projects. This probably also resulted in a fair amount of “catching up behavior” during the transition to graduate school. Many of our students benefit from having extensive research training and even conference presentations. Collaboration helps them become more prepared for doing research in graduate school.

To some degree, our decisions on the types of research collaboration have been pragmatic. For example, the experiments we run utilize “off
the shelf” personal computers and standard software packages. This low budget approach prevents the cost of research from becoming a barrier. Keeping research costs down has also eliminated the need to rely on extramural support and the required time involvement for grant writing and grant management. We often decide collectively to each take charge of different projects and, of the two concurrent projects, only one of them might be highly risky in terms of whether it would result in publishable data. This spreads out the risks involved in taking on projects that might not be publishable. Still, even these more risky projects have resulted in many conference presentations, most of which have involved students. Quite clearly in our own opinion and experience, collaboration between colleagues and students was perhaps the most significant factor contributing to our publication record and subsequent success of our promotion applications.

It is interesting to consider that technology has greatly facilitated our collaborations—communicating ideas via email, exchanging drafts of manuscripts electronically, etc. It would be interesting to determine if such a means of communication is more efficient in some ways than face-to-face collaborations, where sometimes the interactions are not always to the point. For example, there is no time wasted in the hallways talking about the latest student misbehaviors. One might argue, of course, that email can have its downsides in that there is greater room for miscommunication. We have faced some of these challenges in relying mainly on email communications. Sometimes, due to our schedules, email messages may go unanswered for several days or more. Also, there have been occasions where our email messages are misinterpreted, or questions that we ask of each other remain unanswered in an email response, especially when a question is asked several paragraphs into a lengthy email. We have found on several occasions, as a result of these challenges, that we needed to have a phone or video conference to discuss complex ideas that could have taken extensive time and effort to carefully articulate in an email.

In sum, we view research collaboration as a very effective means for maintaining active research programs, which contributed extensively to the strength of our promotion applications. Our collaboration has been a very positive experience and we wish others who are considering collaborative projects at least as much success as we have been fortunate to experience.

References


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Funding: What You Need to Know About Grant Writing

Hundreds of thousands of grant awards are made annually by government agencies, foundations, private sources and, increasingly, from the business sector. Most awards are made to universities and research institutions for the purpose of supporting scholarly work while a smaller number are awarded to community organizations, businesses and individuals. Many grant awards are made with the specific purpose of developing new products with high commercial potential such as prescription drugs, hardware/software, and engineering applications, while other grants support basic research across a broad spectrum (e.g., chemistry, biology, physics). A smaller pool of grant awards supports a variety of scholarly work including publishing, program support, training, travel, community outreach, and student research.

The good news is that with a set of clear goals and objectives and some technical assistance from your home institution’s business or sponsored research office, most faculty members can be successful grant writers. The following information contains a brief introduction to grantsmanship.

The first step is to read the research section of the faculty manual. It is critical that you determine if you are allowed to be a principal investigator (PI; e.g., tenure track, tenured faculty). The PI is the person who has sole responsibility for the technical conduct of the award. Some institutions allow non-tenure track lecturers to also participate as a PI.

Note: Be sure you understand your institution’s regulations and policies before you initiate the grant writing process.

Why Write a Grant?

Grant awards provide scarce resources not available at many academic institutions. Using grant funds, you can participate in research projects which may lead to new discoveries in your field. Program projects can support the development of new teaching methods, delivery of much needed community services, or an increase in student retention and graduation rates. Other awards provide support for the purchase of much needed research and classroom equipment, software, computers, books, and travel to conferences. Many awards provide support for undergraduate students who can participate in meaningful research under the tutelage of their major professor. Grant awards also provide release time from teaching, summer salary, and are, in most institutions, considered as a factor in the promotion and tenure process.

What Will the Grant Award Cover?

While there is wide variation in acceptable costs, most research grant awards will pay for release time (e.g. 25% = one course) and summer salary for the PI and salary for other personnel such as Co-Principal Investigators, technicians, and students. In addition to salary, awards will cover a percentage of fringe benefits for all working on the project. Your human resources department can assist you in determining these costs. Other costs can include travel, supplies and materials, equipment, consultants, contractual agreements, participant costs, reprint costs and other items as specified in the grant application package.

An additional budget item is the indirect cost (administrative cost) which is a percentage of the total cost (in some cases excluding equipment). In other cases, the indirect cost is calculated on salary, wages, and fringe benefits only. Your sponsored programs or business office will provide you with the established rate for your university as determined by the federal government.

In-House Help

Before you place your fingers on the keyboard, you need to determine what you hope to accomplish and whether you require external funding. Start-up projects such as testing the validity of data collection instructions, gaining access to a research population or designing a research laboratory may not require a sponsored grant. Many institutions have small start-up grants (e.g., $2,500) that allow you to pilot test your ideas, develop the background and rationale for a future external proposal, publish preliminary data or travel to an important professional conference. Visit your sponsored research office to determine if such funds are available and how you can apply. If no such funding is available, the next question should be “what services are provided by the university for the new grant writer?”
Working with Your Sponsored Programs Office

Most universities support the services of grants managers who can direct you to funding sources. Some schools have access to commercially available databases such as IRIS or InfoED that support keyword searches of tens of thousands of funding sources. In addition to locating a funding source, other services may be available such as budget development, editorial services, duplication and mailing or electronic submission of the application.

Additionally, you will want to understand the signatory process and the timeline for getting your proposal to the funding source by the deadline (e.g., 5 business days prior to submission of an application). With the introduction of electronic grant submission, universities are establishing guidelines to ensure proper processing. This process may mean that your sponsored research office may need to establish an account with a funding agency (e.g., National Science Foundation) for you before you can access application forms. The staff of sponsored research offices is one of your most powerful allies in the process of securing external funds.

Sign-off and Electronic Submission

Most institutions have a formal process for routing an application for internal review and approval. Typically, your application will be reviewed by your supervisor, the office of sponsored programs or business office and, perhaps, other administrators. Generally, the process takes a few days and may result in a need for clarification or correction.

Many applications must be submitted electronically by an official university signatory. Most federal grant applications are submitted using grants.gov. Your institution must register with the government prior to submitting an application on-line. Because of problems with these systems, you should give yourself some extra time. This strategy will allow the official signatory the opportunity to seek assistance from the grants.gov help desk.

Cost Sharing and Matching Costs

Some funding agencies require that the applicant organization pay a portion of the cost of the project. Before you start an application with such a requirement, it is important that you determine the availability of funds from your home institution. Unfortunately, this requirement can be a barrier to funding.

Some universities provide matching and cost sharing through their offices of institutional advancement (e.g., gifts, donations). Other universities allow the PI to use university funds to pay their salary as the source of matching funds. Note: In general, the library, the information technology department, classrooms, laboratories, heat, light and other university services cannot be used as cost share or matching funds as these elements are used to support the indirect cost calculation for your institution.

Working with Collaborators

Many types of grants require collaborators or consultants. In general, most universities do not allow within-house consultants primarily because grant money cannot be used to increase academic salaries (with the exception of summer salaries or moving from a part-time position to a full time position). Be sure to determine the process your institution uses and what formal agreements may need to be secured prior to entering into discussion with others outside of your campus.

Finding Funding Opportunities

Your sponsored research office may provide access to commercial services, training in the use of the more complicated internet sites or even conduct a search for you. The following sites provide access to most funding sources. A quick a tour of funding sites can be found using Google and Google Scholar.

grants.gov

The federal government built an internet-based system that lists all federally available grant opportunities using key word search strategies. A useful tutorial is available. This is also the site used by your sponsored research office when submitting most federal grant applications. You do not need permission to access application material, however, only the designated signatory for your campus can submit the application using this system. Unfortunately, this system is complex and there is a steep learning curve.

FedBizOps

Like grants.gov, this internet-based system provides access to all contract related information for all federal agencies. Unlike grants that are considered “best level of effort,” contracts are legally binding instruments that require delivery of services and products on time
and within budget. While contracting is a powerful way to support projects, it comes with regulations and requirements that can be a bit daunting to the novice.

The Foundation Center
The Center provides access to opportunities supported by not-for-profit organizations (e.g., Bill and Melinda Gates Foundation). Located at foundationcenter.org, the Center supports information on more than 600 foundations. The Center offers many outstanding training programs and publications for the grant writer.

The Council on Foundations
The Council bundles givers into a collective that supports philanthropy. It does not award grants, rather it provides a center for locating information on grant givers located at www.cof.org.

SPIN-Plus
The commercial service allows you to access national and international government and private funding sources. Its Smarts module allows you to match your profile with funding opportunities and provide updates by sending information to your email account. SPIN is found at http://ris.ucc.ie/Products.stm#spin.

Community of Science
Located at http://www.cos.com/services/, the Community of Science offers access to over 26,000 opportunities, plus a funding alert that will send you a weekly customized notice of new opportunities. Individual membership is free.

Sponsored Research Information
Many smaller colleges and universities cannot afford the staff and resources necessary to support the needs of the entire faculty. By taking advantage of large research university web sites, you can access important information and resources. For example, Iowa State University provides weekly bulletins of funding opportunities by research field located at http://www.vpresearch.iastate.edu/OSP/Maillogs.html and Harvard University provides step-by-step instruction in proposal and budget development located at http://vpf-web.harvard.edu/osr/proposal/proposal_main.shtml.

Obtaining Assistance With the Proposal

The Formal Proposal
The format and content of any proposal or application will necessarily vary with the requirements of the potential sponsor. An unsolicited grant proposal will differ significantly from a proposal submitted in response to a competitive bidding situation, while new, non-competitive continuations or continuation proposals will differ from each other. Because of the unique character of application, it is difficult to give specific cookbook-like directions.

Some sponsoring organizations provide instructions for proposals, others require the use of pre-printed forms, and some have prescribed rules. Applications or proposals submitted to some sponsors must meet deadlines while other sponsors will accept proposals at any time of the year. When there is a specified date and time, you must meet the deadline or risk the almost certain reality that your application will be rejected.

Grant proposals may be submitted concurrently to several organizations; a statement of concurrent submission should be included in such cases stating the names of organizations to which the proposal was submitted. For most federal grants, this procedure is a requirement. For applications to non-federal sponsors, it is recommended that each proposal have as little overlap as possible. Most areas of research are sufficiently specialized that reviewers tend to pick-up on applicants who are shopping for a funding source. This practice can result in negative consequences.

For samples, examples, and tips on how to improve the body of your application, try one or more of the following sites:

- Grant writing tips by Sylvie McGree is an older site, but it still provides a clear and focused presentation on grant writing basics found at http://www.seanet.com/~sylvie/grants.htm.
- Tips for grants to conduct biomedical research provided by the National Institutes of Health (NIH) can be found at http://grants.nih.gov/grants/grant_tips.htm.
- Help with community grants provided by Lone Eagle can be found at http://lone-eagles.com/granthelp.htm.
- The best site for project grants can be found at http://www.epa.gov/ogd/recipient/tips.htm. Even if the environment is not your field, EPA provides an excellent guide to project grants, in general.
Tips from James Madison University can be found at http://www.jmu.edu/sponsprog/writingtips.html.

A Principal Investigators Manual can be found at www.umes.edu/osp.

Assurances
While your institution will have to certify that civil rights protections, codes of ethical conduct, and other assurances are in place, you, as the PI, will have to determine if the following assurances apply to your proposed efforts. Most institutions have institutional review boards or committees that conduct the reviews according to a published set of procedures. You should contact the appropriate committee when planning your application to determine how and when you need to apply for approval.

Human Subjects Protection
NIH serves as the lead federal agency charged with monitoring the protection of subjects involved in research including educational and social research. For additional information, access NIH’s Office for Human Resource Protection at http://www.hhs.gov/ohrp/policy.

Institutional Animal Use and Care
The NIH is also involved in oversight of research involving animals. For additional information, access NIH’s Office of Laboratory Animal Welfare at http://grants.nih.gov/grants/olaw/olaw.htm and the Office of Animal Care and Use at http://oacu.od.nih.gov.

Biosafety
NIH also provides guidance to researchers involved in research when biosafety concerns exist. For additional information, access guidelines at http://www4.od.nih.gov/oba/rac/guidelines_02/NIH_Guidelines_Apr_02.htm.

Lobbying
Applicants to federal projects must disclose lobbying efforts that may influence the outcome of review. Standard forms are provided in the grants.gov application kit.

Managing an Award

The Funding Mechanism
Most awards are cost reimbursable mechanisms. Your institution will bill the sponsoring agency or organization based on actual expenses incurred and will maintain a record of expenses for up to seven years after the closeout of an award. Federal grant awards are governed by a set of regulations published by the Office of Management and Budget. Circulars A-21 and A-33 are the regulations that instruct universities on how they can spend and report on federal awards. Your office of sponsored research or the business office will closely follow these regulations and assist you with budget management to ensure institutional compliance. Failure to comply with these regulations can result in suspension or debarment from participation in federal programs. Many other sponsoring organizations follow the general policies of the federal government. A small number of grants from foundations and private sector may be forward funded, that is, you receive the money up front with few reporting requirements. These awards tend to be small and time limited in scope. Most awards will have terms and conditions that restrict spending and serve to guide you and your institution. Knowledge of these conditions and the general requirements for performance and compliance will make your life less complicated and the project run more smoothly.

Reporting
Most grant awards require you to report on the technical aspects of your project. Failure to comply with this requirement could result in termination of the award. Financial reports are done by an accountant in collaboration with the office of the comptroller or chief financial officer.

No-Cost Extension and Closeout
In some cases, you may experience a delay in start-up of a project and need additional time to complete a project or set of experiments. Most sponsoring organizations have a process for awarding a no-cost extension for up to one year after the original closeout date. Each sponsor may differ when it comes to how the process works. The best advice is to contact the sponsor and ask about their procedures well ahead of time or contact your sponsored research office.
Additional Resources


Catherine S. Bolek
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Catherine Bolek, MS, has been the Director of the Office of Sponsored Research and Programs at the University of Maryland Eastern Shore since 1991. Prior to 1991, she was a Program Director for NIH from 1980 to 1991. Mrs. Bolek is the PI for grant and contract awards from the Department of Defense, Environmental Protection Agency, the State of Maryland and other government and private sector sources. She is the author of books, monographs, chapters and articles focusing on grant-related topics and a director for Proposal Development seminars and peer reviewer for health related grant applications. She is a grant writing consultant in the areas of health, information technology and environment.

Ronald G. Forsythe, PhD, has been the Vice President for Information Technology and Commercialization at the University of Maryland Eastern Shore since 2000. He is currently the PI for grant and contract awards from the Department of Defense, the State of Maryland and other government and private sector sources. He created a research corporation to streamline the university’s ability to provide contractual services to corporate and government clients and to facilitate economic development in the region.

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NEW CUR Institute!

Beginning a Research Program in the Natural Sciences at a Predominantly Undergraduate Institution

New Offering: June 6-8, 2008 Davidson College, Davidson, NC

Starting a successful research program and doing scholarly work at a predominantly undergraduate institution poses unique challenges for a beginning faculty member. The overall goal of the institute is to give pre-tenured faculty the opportunity to learn from and discuss with experienced faculty how to establish and manage a research program with undergraduates. A range of topics will be covered during the institute, and the specific goals include ways to achieve career success in undergraduate research by learning how to:

• select undergraduate researchers
• mentor student researchers and develop and use their research skills
• mentor students in their writing of research reports and theses
• develop and select research projects appropriate for undergraduates
• adapt to an undergraduate research environment vs. that in graduate school
• link research to the classroom and
• develop grantsmanship skills related to gaining external and institutional research support

Apply today at the CUR website at http://www.cur.org/institutes.html
At The College of Wooster, undergraduate research has been part of the institutional culture since 1947, when then President Howard Lowry introduced Independent Study (IS) as a universal senior capstone experience. Since the early 1950's, each and every Wooster senior has completed the year-long project that is required for graduation, and for nearly 60 years, then, this program has invited “all students to come to their best in terms of their own talents.” With an underlying belief that participation in research is the best way to train students for scientific careers, Wooster's philosophy has been to treat students as co-discoverers and teach them to become independent in their reasoning and the process of research. Supported by a generous faculty leaves program and extensive faculty development opportunities, IS has thus created an institutional framework of undergraduate research that has also been an essential part of faculty development. This nationally recognized IS program requires all Wooster students to demonstrate their capacity for critical inquiry, their ability to create new knowledge in a disciplinary context, and their skill at sharing their learning with a larger community by creating an original research project, written work, performance, or exhibit of artwork during their senior year. Following this phase of the work, students have an oral defense (or a jury) where they present and defend their projects. Although IS is the culmination of a student's learning in a particular discipline, the goals of the program go beyond disciplinary training. For students come to understand not only their chosen subject but also the nature of learning itself as IS encourages them to think creatively and to take an original thought from concept to completion and then present that process in a written thesis. In this article, we will explore, first, more general approaches to ways in which junior faculty can develop a successful research agenda within an undergraduate research environment, and, second, some of the specific elements in which Wooster's experience with IS shows how an undergraduate research program can create a supportive framework for both student and faculty research.

Defining a Research Agenda

Even at undergraduate, teaching-centered institutions the expectations for tenure and promotion almost always include some element of research and publication. Consequently, it is wise to think through how to develop a research plan that will successfully involve undergraduates and also to consider how that plan will fit within the department's infrastructure and research culture. It is also important to ensure that the resources necessary for success are in place. The critical components in developing a lab include space, equipment, and staff, and your first step should be an inventory of the space, equipment, and people currently available on campus, being careful to look for potential points of synergy across your campus. Is there any equipment currently in the department that you might be able to share? Are you succeeding someone who did research in an area similar to yours? Are there researchers outside your department who might be potential resources? Is there dedicated space for your lab? Are there any institutional mechanisms that support student research assistants? The answers to these questions will go a long way toward shaping the development of your lab.

When purchasing equipment for your lab, keep an eye to the future. Will this technology be obsolete in five years? Is the equipment versatile enough to grow with you as your research agenda inevitably evolves? Manufacturers can be quite flexible in helping you find exactly the equipment that meets your needs, sometimes even loaning equipment for short periods of time to ensure that you have the right model and set of features. Listservs and professional groups can also be quite helpful in this regard. Another option is to buy used equipment, and there are auction sites on the web that sell used scientific equipment at a fraction of the new cost. Also, keep in mind the future maintenance and upkeep requirements for any equipment you purchase. Sometimes it may be more efficient to strike up collaborations with nearby research universities or even pay user fees to use their equipment.

Collaborations of this sort can save both the initial equipment investment and, in many cases, precious laboratory space. Ideally, you will have your own dedicated laboratory space. However, this can sometimes be a problem, particularly on small campuses. Other potential solutions include sharing laboratory space with colleagues or developing teaching labs that can double as space for research. Although all of these options present their own set of challenges and difficulties, they do at least allow you and your students to conduct research.
Funding Your Research

The probability of a successful and productive research program is increased significantly when you have adequate funding to support your efforts. Securing an external grant also shows commitment to your discipline, reflects well on your institution, and puts you in a stronger position with respect to tenure and reappointment decisions. Simply writing a grant proposal can also help lay the foundation and the theoretical framework for your writing, especially for that first paper you develop independently from your graduate school advisor. And, if the proposal is successful, of course, the resulting boost in confidence will help with writing the paper itself. Perseverance, however, is essential, for learning to write successful grant proposals is an incremental process and requires dedication, patience, and above all, persistence: the strongest predictor of obtaining external funding is the number of proposals submitted.

One important stepping stone to obtaining an external grant can be getting some internal funding first. Many institutions have small in-house grants that can facilitate pilot studies and put you in a better position to seek external funding. These programs are generally not as competitive as external programs, and in addition to providing support for your research, they give you some experience with writing proposals, developing budgets, and conducting sponsored research. Senior faculty mentors are often invaluable resources in helping identify these internal pots of funding.

Another important stepping stone can be applying for smaller external “starter grants.” Many agencies and foundations have special funding set aside for early-career researchers, while others have special funding opportunities for research with undergraduate students. The success and the confidence that comes from obtaining a smaller grant can help strengthen a larger proposal down the line, and an established track record for conducting sponsored research on a smaller scale gives proposal reviewers and program officers more confidence that you will be able to carry out larger projects.

Taking advantage of opportunities to learn about proposal writing is also advisable. Many institutions and organizations (including CUR) hold proposal-writing workshops and seminars that can help you understand the process and focus your proposal, thereby increasing your chances for success. Often, presenters at these workshops include agency program officers and proposal reviewers who can give an insider’s view of what makes a successful grant proposal. Program officers in particular have an interest in receiving the best proposals possible. For this reason they are generally receptive to questions and are happy to give advice on a draft prior to final submission.

Finally, find out the culture and process of submitting external proposals at your institution. Most federal agencies that provide funding opportunities make grants to your institution, not to you as an individual. For this reason it is important to contact your sponsored programs office, or other official who is responsible for administering external grants. Very often this office can also be invaluable in identifying funding opportunities, developing budgets, and answering questions about any number of proposal submission issues.

Working with Undergraduates

Turning from these general recommendations back to our experience with Wooster’s rich undergraduate research environment, what opportunities and issues do we see that may help you in your local context? A first question that comes to mind is that of how you engage student researchers as both apprentice scientists and potential collaborators. Like many schools, Wooster has programs that allow students to serve as research assistants, either for course credit or for summer pay. Selecting the students you will work with needs to be done carefully: ask for references and find out about the student’s abilities, interests and goals. Motivated and engaged undergraduate researchers can significantly enhance your ability to do research. Disinterested ones can significantly detract from it. Participating in organized summer research activities that your campus hosts will give you the opportunity to work with student summer researchers and allow you to
build those important mentoring relationships with potentially strong students who are likely to continue working with you throughout their undergraduate careers.

At Wooster, and especially in the natural sciences, a common IS model is for seniors to work on projects related to faculty members’ research areas. While students often propose and conduct their own projects as well, there have also been cases where student interest in projects has led faculty to branch out in new directions in their own research. One Physics major’s project on Self Organized Criticality, for instance, sparked subsequent interest in other students as well as the adviser, who has continued this area of research for over ten years. Elsewhere, an analytical chemist’s work to develop sensors based on molecularly imprinted materials -- work which has led to two patents and a major research collaboration with scientists at Georgia Tech -- began with the serendipitous discovery of an unusual, and unexpected, reaction by a student researcher.

Student engagement in faculty research has many implications, not all of which are immediately apparent, and notable among these is the issue of multiple collaborators. Typically, a senior starts on a project and gets it to a point where preliminary results are gathered but does not bring it to full conclusion. A subsequent summer student may then continue the project and take it to the next level, and a project frequently requires three or four students’ contributions before it reaches a point of being ready for publication. Since the faculty mentor thus has to train two or three undergraduates before reaching the conclusion of one project, there is certainly a loss of time and continuity, especially by comparison with research university environments where a single graduate student is likely to complete a project. To compensate for the difficulties this succession of student collaborators can create, one strategy is to require the new student to repeat at least some part of the project to ensure repeatability and consistent application of the methodology. Wooster faculty members have found this to be a particularly valuable method of insuring continuity in the work of the project. Another strategy has been for a number of students to work on different aspects of one project with the faculty member then synthesizing the results from the various projects. Compounding the challenges of such multi-generational student engagement is the related issue of maintaining accurate laboratory notes. When, perhaps years after the project began, one is at the point of writing up, it is essential to be able to go back, check student lab notebooks, get all the necessary information, verify calculations, and check for consistency. While part of the training of any scientist is to record complete information on any project, it is much harder to interpret someone else’s notes and harder still to interpret the notes of several iterations of student researchers. Thus it becomes imperative to train students in good record keeping of their lab work. Moreover, faculty members need to remain in contact with their students long after graduation, so that they may be able to clarify any questions that emerge during the actual writing-up process. In facing all these challenges, Wooster’s generous faculty leaves program provides essential time for examining the undergraduate co-authors’ data, occasionally repeating parts of the work for verification, and for being able to synthesize all the findings into a final paper.

Working with various students on one project also raises the issue of intellectual property and the question of how to acknowledge student work. What should be the level of student contribution to warrant co-authorship as opposed to a simple acknowledgement, for instance? In the sciences, if a student has contributed any of the data or constructed part of the equipment and worked through problemsolving to get the equipment to the stage of data collection, it is most likely that student will be included as a co-author in any paper presentation or publication. On the other hand, if the student worked for a whole summer and did very little to make progress in the project, a simple acknowledgement may suffice. In the former case, even though the paper is written by the faculty member, student co-authors should have a chance to help with the process and certainly to read and comment on the draft.
Writing and Preparing to Publish

Given the demands upon faculty time that are invariably part of life at a teaching-focused institution, developing one’s research program at a primarily undergraduate institution (PUI) can be especially challenging, especially when it comes to the final phase of a project: preparing it for publication. While faculty who choose to pursue such careers generally recognize that teaching and research are complementary and that their research informs their teaching, the hands-on, engaged nature of the work with undergraduates leaves very little time during the semesters to do any serious writing. For a pre-tenure faculty member, writing that first paper or article can thus seem arduous and even intimidating, especially when the project involves the first work one is doing totally independently from the graduate adviser.

So, just how does a junior faculty member break through and turn all the work he or she has done, whether independently or in collaboration with one or more students, into publishable form? A mechanistic paradigm to that work may be to break the task of writing a paper into smaller components. Setting aside a few hours each week to survey the literature and prepare a bibliography, analyze the data, construct the graphs, begin the actual writing -- steps such as these can reduce a seemingly impossible task into more manageable segments. Seeking a mentor, either internally at one’s institution or elsewhere (for instance, through the mentoring program run by CUR divisions) can be invaluable. Peer support can also be found through the grass-roots campus groups junior faculty often form to read one another’s drafts -- if your campus doesn’t have one, you can be the initiator!

Once the draft seems ready to send out, then the critical question of selecting a journal for submission comes to the fore. If you have not written with a specific journal in mind, natural choices would be to seek out the specialized journal where similar work gets published or a journal from which you drew several of the citations used in your own paper. The key, above all, is to be willing to send work out for review: even if the first version is rejected, reviewers’ comments are usually very helpful in further revisions, and the worst possible attitude is to be frozen either by fear of rejection and/or by the desire to strive for perfection and never get to the point of sending work out. Publish or perish, perhaps; don’t submit and perish, almost certainly.

Conclusion

Working in a research-rich PUI, then, can be a creative and supportive environment for faculty as well as students. While Wooster is unusual in having such a long history of undergraduate research and, even more, in its curricular requirement for every student to engage in a year-long senior project, the opportunities it provides are certainly not unique. With careful planning and organization, faculty members at Wooster and elsewhere who engage with their students and colleagues in the development of research programs discover that their own intellectual lives are enriched and advanced and that investment in their students turns out to be a rich source for their own professional development and success.

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John Neuhoff plays the saxophone and teaches perception and evolution in the Psychology department at The College of Wooster. A graduate of Baldwin Wallace College and Kent State University, he has published in Nature, Science, and the Proceedings of the National Academies of Science. He has numerous publications with undergraduate student coauthors and has received grants from the National Science Foundation and the National Institute for Occupational Safety and Health. He is a CUR councilor in Psychology, the founding chair of the Auditory Perception, Cognition, and Action Meeting (APCAM) and is a member of the Board of Directors for the International Community for Auditory Display (ICAD). His saxophone career has yet to blossom. Email: jneuhoff@wooster.edu
The title sounds pretty daunting, but with good time management and good personal and professional choices, it is possible to excel at the academic triumvirate and even have a little bit of an outside life as well. In this article, I offer suggestions for finding this balance in your academic career. It is always dangerous to give advice, lest others point to times when you haven’t followed it yourself. So let me begin by admitting that I have not always followed the advice contained herein and am certainly not a perfect faculty member. As just one of many examples, I was a few days late with this article. But I hope that the suggestions below may be useful to others as they have been to me and my colleagues as we have struggled to do it all and do it all well in the realms of teaching, research, service, and life.

Finding a Mentor

When you begin an academic career, one of the first things you should try to do is to find a mentor. Some programs assign a mentor to new faculty, but in my experience, informal mentor relationships are more helpful. Seek out someone in your department who has been at the university long enough to know the ropes and who is doing things that you value and want to emulate. You don’t have to wait for the person to approach you. Faculty tend to have big egos. They’ll love it if you ask them for help and advice (and probably like you more as well; Jecker & Landy, 1969). It’s especially important to have a mentor that you trust who you can ask about actions before you take them. When I arrived at UNI, I was assigned a mentor who was a tenured female faculty member in my sub-area of psychology. She was nice, and I went to her with a couple of questions, but we never clicked. Instead, I found myself talking to an older male faculty member who shared my interests in computers and statistics. He acted as my protector. For example, I was bothered by some of the research procedures that were in place when I arrived in the department that I felt were at best ethical question marks. If the procedures were changed, however, it would be more difficult for some of the faculty to do their research. So my first step, before complaining at a department meeting or going to the head, was to talk to my mentor. He agreed with my point of view and suggested that he bring up the issue rather than me so that any ire would be directed at him.

He did bring it up, and within months things were changed. I helped design the procedures for change, but no one blamed me, or my mentor for that matter, because he knew the personalities involved and how to best introduce and deal with the problem. In the south, when we follow behind a car that is going faster than us on the highway, we say the driver is “running point” for us. We are reaping the benefits of his effort, and hopefully if there are consequences (e.g., a police siren), it will be him instead of us who is caught. I’ve always thought of my mentor as my career “point person.” He helped me get things done that I wanted with minimal consequences and risk to me. Try to find your own point person.

Teaching

At an undergraduate or primarily undergraduate institution, your first responsibility is to be an excellent teacher. There are several good books on teaching techniques such as lecturing and grading (e.g., Forsyth, 2003; McKeachie & Svinicki, 2005; see Darley, Zanna & Roediger, 2004 for academic career advice more generally). Instead, my focus here is on maintaining balance with other parts of your life as you work to improve your classes.

Think about teaching-related tasks in terms of an effort (for you) to benefit (for your students) ratio. If something has a large benefit for your students, it may be worth putting in a great deal of effort. Assigning and providing copious feedback on papers is one example. It is a lot of work to do this (and not one of my favorite activities), but it also holds great benefits for the students, and so knowing that, I continue to assign and grade integrative papers. I also take time in class to teach scientific writing and grammar and require students to turn in outlines and rough drafts of their papers. These tasks take time now but are beneficial for students as well as for me as a grader. Other tasks may be relatively small benefit but also small effort, such as adding a new demonstration to a lecture on close relationships. These are also worth doing.

Some things you can do as an instructor can even have large benefits (to your students or to you) for small efforts. When I first started teaching at UNI, I was assigned to teach a course that another instructor had been teaching for years. One of the first things I did was to...
ask him if I could see his syllabus. He not only sent that, but handouts and assignments, some of which I’m still using ten years later. Don’t be afraid to ask other instructors about what they do in their course. Almost everyone will find it flattering; it will make them feel respected and appreciated, and they will make positive attributions about you and the seriousness with which you take your teaching.

What you want to avoid, however, are large effort activities that only glean small benefits. For example, it’s tempting to switch textbooks after a time or two teaching a course, but it can take a lot of time to re-do your course to fit the new book. This may be worth it if the book is vastly superior to your old one, or if it approaches the field in a new way that you want to use in your class. But if you are just thinking of changing because it’s slightly better written or because it covers a topic your current book doesn’t, stop to think about whether it’s worth it, or whether your current textbook’s limitations could be equally well addressed by adding lecture material or a supplemental reading.

New course preparations can have a large effort to benefit ratio as well. Teaching a new course can be fun and exciting, and if it’s a topic you really care about, the benefits to students (and yourself) can be great. Often, however, faculty members are asked to teach courses that may be only marginally related to their interests or expertise. Untenured faculty members, in particular, have to be careful not to take on every course that is offered to them. One faculty member I know taught eight different course preparations in his first three years, in a department where most faculty never teach more than four different preparations ever. The tenured faculty and administration were not purposefully trying to make this faculty member suffer. There were good reasons for asking him to teach each course (e.g., it seemed related to his interests, it would give him increased access to graduate students), but no one thought about all the other courses he was teaching. Sometimes, we add this work on ourselves at no one else’s particular urging. I had to stop myself earlier this semester from applying to develop a new course. It would be a really fun class to teach, but it would be an overload, and to do it right now would put my sanity in jeopardy. Even though it can be hard, especially when untenured, you have to nicely say “no” at some point, even to yourself. Or at least say “let me think about it” and then run to your mentor for advice on how to proceed or get you out of the situation.

Research

Research can be more challenging at a primarily undergraduate institution. We are at a relative disadvantage in terms of funding, space, equipment, and support in comparison to our R-1 brethren. But for me these disadvantages are more than compensated for by our increased opportunities to work with early career students—undergraduate and masters level students who you can really watch develop. One of the greatest joys in my academic life is seeing a student become more confident and a better critical thinker as she learns more about research. Undergraduates are also enthusiastic about research and eager to try anything, which makes them really fun research collaborators. They don’t yet know that “that won’t work,” and are willing to take risks with research that PhD students might not.

The first step to a successful undergraduate lab is to recruit good students. My first few semesters I made announcements in classes, but soon I found that I no longer had to actively recruit. My student assistants recruited others for our lab, and they were more selective about whom they talked to about the opportunities than I would have been. I have never set up an application process or turned students down, although I can see the advantages of this system. But I’ve also never had a dud. Some students have been more fun than others and some have been more intellectually stimulating than others, but I’ve
gotten something out of working with each of them. Ideally, I try to sign up students early in their careers, as sophomores or at least juniors. This gives me a chance to get them trained to do increasingly more independent work and allows them to help with the training of incoming students. It also gives me a chance to get to know them better; I have lasting friendships with some of my former undergraduate research assistants, including one who is now a faculty member at my institution.

For me, a team approach to research works well. I tell students that they must commit to at least two semesters of working with me for about ten hours a week. At a research team meeting at the beginning of the fall semester, I outline the idea or hypothesis and general methodology for several studies that I’d like to conduct that year. Each student picks at least one project, and project subgroups of two to three students meet with me each week to discuss what they have accomplished and make goals for the next week’s work. Although I have an idea of how I want to conduct the study, I have the students help with the design and creation of stimulus materials, so that it ends up being as much their study as mine. We also meet as a large group once a week to discuss projects and get everyone’s help with design and data collection issues. After students have worked with me for one or two semesters, they may choose to also do a more independent project, such as an honors thesis.

One of the keys to working with students on these independent projects is to avoid letting them lead you in too many directions. At first, I was excited to have students, and if they came to me with an idea that was at all related to social psychology, I was on board. I found over time that not only did this decrease my own productivity, but it wasn’t necessarily the best thing for the students. So now even when students have graduated to more independent research, I try to get them to find projects that fall at least broadly within one of my areas of expertise. This still gives them freedom to pursue something that interests them—I don’t dictate the study or hypotheses or make them use one of my pet theories—but it also helps my productivity. For example, I did a project with one student who was interested in recycling behaviors (not my area) on how peers influence these behaviors (more my area). These collaborations are sometimes even more fun for me than my own research. In my program of research, I usually have a pretty strong hunch about how the results will come out. On the other hand, I’m not really sure what to expect in one of my current student’s honors theses where we’re investigating whether participating in a freshman housing program has lasting, positive effect on students’ adjustment to college. I will be as excited as the student to find out!

Goals and timelines can help mostly undergraduate labs to function well. I take a group of 10 to 15 students to present at the Midwestern Psychological Association conference each spring. This gives the students something to work toward, and a timeline for completing the project that has to be met. I also hold high standards for the students. Their poster presentations go through many, many drafts, and I teach them to do the statistical analyses and interpret them rather than doing them for them. When they’ve finished a project, they are justifiably proud of the outcome, and I’m really proud of them as well. My students also present at other (undergraduate as well as national) conferences. Disciplinary and interdisciplinary associations related to teaching (e.g., Society for Teaching in Psychology, Council for Undergraduate Research) are good sources for finding out about these undergraduate conferences and journals.

While undergraduate students can be fun to work with, it can take more time to collaborate with them than it would to do the study as sole author, particularly when it comes to “writing it up.” One casualty can be our own research writing. I highly recommend Silvia (2007) for suggestions on how to get more writing done. Much of it boils down to scheduling writing time, and sticking to your schedule. Collaboration and making commitments to others who will remind us if we are late can also make pushing research through to publication more likely.

**Service**

Sometimes faculty talk about service like it’s the evil knight keeping them from their two true loves, the beautiful twins of teaching and research. But service is only onerous if you do the wrong things. My best advice for service is to find service commitments that you care about. In my second year as a faculty member, I was asked to be on a
committee that reviewed student research grant applications. I loved the committee—we got to help students with research projects and give out money. I made good friends, enjoyed our meetings, and learned how to better write for interdisciplinary audiences. Later I was asked to be on a scholarship committee; I thought this one would be fun as well, but instead I found it boring. We spent most of our time looking at numbers and arguing about the quality of particular high schools in a state I'd just moved to and the usefulness and interpretation of the scores from a test (ACT) that I'd never taken. It just wasn't for me, so I got off of that committee and gave it to someone else who found it much more interesting. Find service you like, and if you don't like it, don't be afraid to try to get out of it and find something else. You'll do your best work when you're committed to the committee's cause, so it's in everyone's best interest for you to have a good fit. You also can't do your best work when you're on too many committees, so keep your commitments focused to those you feel the most of a call for, and use your mentor to help you find ways to say “no” nicely.

Finding a Life

So, while managing to teach invigorating classes, getting students excited about research, and contributing to the university through important service, somehow you're supposed to also find time for a life? I think that one of the most important things to remember in finding this balance is realize that you don't have to do it all. In life, as in work, try to do the things you like doing and forget about the rest. Don’t like to house clean? Hire someone to do it, or just don’t vacuum that often. The clean police won’t arrest you—as long as you can live with it, you’re fine. Don’t like to cook or garden? Don’t. Focus on the tasks you like to do and give the rest minimal time. I don’t really like doing yard work, so I hire someone to mow often enough to keep the neighbors satisfied and otherwise just let my yard be “landscaped by God.” Use your off time for active pursuits that give you pleasure rather than day-to-day drudgery (see Lyubomirsky, Sheldon & Schkade, 2005 and Csikszentmihalyi, 1997, for examples of research showing the benefits of involving activities rather than passive ones such as watching television).

It is also important to schedule the life you want. Plan ahead and buy tickets for events to ensure you'll go. Write dinners with friends, exercise, shopping, whatever you enjoy, into your calendar. When I first started my job, I'd plan to go to exercise classes, but often something would come up and I wouldn't be able to make it—a student would stop by, or a meeting would last too long. I soon discovered that if exercise was important to me, I had to make it a priority. I now schedule time for exercise, and I don’t let anyone take those times away from me. I tell students and other faculty I’m “at a meeting” and can’t meet with them during those times. I even have a “meeting” every Friday at noon that’s lunch with a friend. I find that as long as I say, “I can’t do it then; I’ve got a meeting” no one says anything or tries to get me to change my schedule. And I don’t feel dishonest or guilty about doing so. If I don’t take care of myself, I’m not going to be any good for anyone. I also take Friday nights and Saturdays off (at least most weeks). Those are my times for friends, family, and nonwork fun. When things go poorly at work (and eventually they will, at least temporarily), you’ll need these connections and outside interests; don’t let them wither during your heavy work phases.

Conclusion

As an untenured faculty member, you have to be concerned about how you're being evaluated and what you're doing. But if you use your teaching time to get the maximum benefit for your effort, work with undergraduate co-authors to further your research, and find service that you enjoy doing, you don’t really need to worry that much. You’ll be doing just the right things—for you and your department.
References


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Helen C. Harton received her PhD from Florida Atlantic University and is currently Professor of Psychology at the University of Northern Iowa. This article is based on panel presentations she has been involved with on faculty balance as part of the Iowa State University Preparing Future Faculty program. Her research is focused on social influence, attitude change, and prejudice, and she has co-authored over 75 regional, national, and international conference presentations and several journal articles with students. In addition to teaching and research, she is the Graduate Coordinator for a large masters program, the survey reviewer for the Institutional Review Board, and active on other university committees. She also teaches Middle Eastern dance classes, directs the Prairie Rose dance troupe, bikes, kayaks, snorkels, and cross-country skis.
Long-distance runners sometimes employ a training technique called speedplay, in which the runner sprints hard for several hundred yards, then coasts to an easy jog for a mile or so, followed by more sprinting. This pattern of intermittent sprinting and jogging is repeated over and over, until a number of miles have been covered. In theory, speedplay sounds fun—even relaxing—but in practice it is exhausting and painful. The sprint leaves one gasping for air, which never abates before it’s time to sprint again.

Speedplay is not unique to running; it’s often practiced in academic research. I have seen colleagues sprint when tenure and promotion deadlines loom—working overtime and neglecting other duties to produce the required number of manuscripts and conference papers at the last minute—and then coast from exhaustion until the next deadline approaches. This approach is mentally and physically taxing, hard on personal and family life, and often detrimental to a long-term, sustained program of research.

Through the tenure process, colleges and universities seek to determine if a faculty member is likely to be a valuable contributor to the institution over the long distance of an academic career, potentially for the next 30 to 40 years. Short distance sprints, while successful in meeting immediate goals, are seldom indicative of long-term success. The tenure committees, senior colleagues, and administrators that I have worked with are impressed more by moderate, sustained progress that builds toward a long-term research program than by short-term successes. Consequently, the goal of tenure-track faculty should be to develop life-long practices that will enable them to be productive throughout their careers, along with a set of achievements by the time of tenure that demonstrate acquisition of these skills. It is my belief, based on 27 years of academic experience as both a faculty member and an administrator, that the most successful tenure candidates focus their efforts, not on the six years of their probationary period, but on developing teaching and research programs that will be productive for an entire career.

Much has been written on the value of research for undergraduate students and several recent studies demonstrate that undergraduate research experiences lead to measurable gains for students in a number of educational outcomes (Lopatto, 2004; Russell, Hancock, & McCullough, 2007; Seymour, Hunter, Laursen, & DeAntoni, 2004). Less has been written about undergraduate research from the perspective of the faculty member—its benefits and costs and how to do it (but see Goodwin, Holmes, & Hoagland, 1999 and Neuenschwander & Schwab, 1995). In this paper, I offer nine suggestions for developing a sustainable, long-term research program for tenure. While many of these suggestions are applicable to faculty at a range of institutions, my primary focus is on researchers at predominately undergraduate institutions (PUIs). My own experience in the sciences flavors many of the examples used.

1. **Fit your research to the local situation.** The long-term success of research at a PUI depends on how well a faculty member negotiates the transition from the research-intensive environment of doctoral and postdoctoral training to the new focus on combined teaching and research at the PUI. As a new faculty member, it is critical to recognize that PUIs are different in many respects from research-intensive institutions. Many PUIs offer great opportunities for developing satisfying and productive research programs, but these will seldom occur at the level or with the resources available at larger institutions. Within the first year of your tenure-track position, carefully evaluate the expectations for tenure at your institution and the resources available to meet them. Develop a research agenda that is realistic in light of these expectations and resources.

My graduate training was in population genetics, applied to amphibians. When I began my first tenure-track position at Connecticut College in 1980, it was clear that I would have difficulty sustaining a research program in the molecular population genetics of my graduate training. I received a total of $2000 for startup expenses, which was not enough to buy even an ultra-cold freezer in which to store samples. Further, the training and knowledge required to carry out projects like those I had completed in graduate school were unrealistic for undergraduate students.

I immediately began to look for possible projects that might fit into my situation. Acid precipitation was attracting a lot of attention—and falling steadily in Connecticut. I realized that little research had been done on the effects of acidity on amphibians. I knew a lot about amphibians, and a colleague introduced me to an experienced
researcher who provided an introduction to methodology. I found that with a little training, undergraduate students were fully capable of carrying out toxicological experiments involving pH. I eventually received a grant from the National Geographic Society and published a total of 12 papers on this topic, most with undergraduate coauthors.

A key element to many successful, sustained research programs at PUIs is adaptation to the local environment. A chemistry faculty member I know found that the research of her graduate training—using spectroscopy to study molecular-level phenomena—was often too complex for undergraduate research students. A switch to environmental chemistry allowed her to develop a successful research program that resulted in tenure. Another colleague arrived at his first teaching position at a liberal arts college to find that there were no animal facilities for the rats he had used in previous experimental work. A switch to behavioral studies with fish opened up a whole new avenue of experimentation, resulting in a long-term research program that produced over 30 publications and 70 conference presentations, most with undergraduate students (Purdy, 2004).

Success stories such as these abound. Often less successful are researchers who refuse to adapt to the realities of research at a PUI, who continue to attempt to pursue a research program of their graduate training which, though successful in the research-intensive atmosphere of a doctoral-granting university, may be difficult to sustain at a smaller school with limited resources and no graduate students. I am not suggesting that all researchers must change the focus of their research when they accept a position at a PUI; many faculty have successfully adapted the research focus of their graduate training to an PUI environment. Nevertheless, most find that some adaptation is required to successfully transition from a major research university to a PUI.

2. **Schedule time for research.** Many faculty suggest that they cannot do research because they lack space, instrumentation, travel money, or access to a research library. In reality, the limiting factor is almost always time (Enhancing Research, 2003).

Most faculty members are extremely busy, with more demands on their time than they can accommodate. Many fall into the habit of triage, focusing on the most immediate needs each day. Because research is long-term, without immediate deadlines, it tends to get postponed. Like many activities, research is most successful when you practice it regularly, rather than waiting for large blocks of time that come at infrequent intervals. Faculty I know who are most successful in research work at it constantly, on a weekly basis, even if the amount of time devoted each week is limited.

I believe that the key to finding time for research is scheduling. Research must be scheduled, just like classes, office hours, and committee meetings. Many faculty members work with their chairs or deans to arrange their teaching schedule so that one day of the week can be devoted entirely to research (Pladziewicz, 1984). One of my junior colleagues arranges her teaching duties so that she has no classes on Fridays. She spends the morning writing and doing her own research activities and devotes the afternoon to conducting experiments with students.

Although regular, continuous work on research throughout the year is important, many scholars at PUIs agree that much of the intensive work gets done during the summer (Craig, 1999; Enhancing Research, 2003), when faculty are unencumbered by teaching and administrative duties. A colleague in psychology gets one good experiment completed during the academic year, but she and her students are able to complete four experiments during the summer. Most successful researchers at PUIs find some way to devote much of their summers to research.

One problem sometimes encountered by faculty at PUIs is finding time for research when the primary, and in some cases only, focus is on teaching. One solution is to look for ways to have undergraduate research count as part of the teaching program. Many colleges and universities have independent study courses that students can take for credit, and many faculty at these institutions encourage their research students to enroll in such courses. This often provides a means of receiving some credit for supervising undergraduate research (Nicks, 2000; Purdy, 2005). An added benefit is that students may take research more seriously if a grade is attached to the process. Some departments have gone further and developed research-training courses that provide undergraduate students with the skills they need to successfully undertake a serious research project, as well as initiate students to research projects (Purdy, 2005).

3. **Keep student research within your expertise.** Students will come to you, eager to work on projects they are excited about, but for which you have limited experience and background. Because I am a population geneticist, I get students wanting to work on the genetics of cancer, genomics, or genetic engineering. I always explain that these
areas are outside my expertise, that I have neither the knowledge nor equipment to help with that kind of project. If one of my colleagues has expertise in the topic, I refer the student to them. But I also take time to tell the student about my own area of research and how they might fit into it. Often, students just want the opportunity to work closely with a faculty member, and the topic is less important than the chance to be a part of a research project.

I learned a number of years ago that directing student research outside your own field can be a huge drain on time—because you must educate yourself about the topic and develop new methodology—and rarely produces substantial results that can be published. This is not to suggest that undergraduate students are incapable of contributing ideas for research projects. After becoming familiar with the methodology and the literature of your area of research, some undergraduates—unfettered by preconceived notions and dogmas—are capable of asking penetrating questions that may move your research in new directions. But, giving a student free reign to pursue any project is unproductive in terms of your own research and, in my experience, rarely results in a good experience for the student.

Find a good mentor. Time and time again, I am impressed by the difference a good mentor can make in the success of a junior colleague. Senior faculty who have life-long, sustained research programs provide junior faculty with visible evidence that successful research can be done at a PUI, and they are often invaluable sources of information about negotiating local obstacles.

When I joined the faculty at Connecticut College 27 years ago, Paul Fell in Zoology and the Bill Niering in Botany (now both deceased) were sterling examples of a life-long commitment to teaching and research at a liberal arts college. They carried out their research with little funding, limited equipment, and heavy teaching and administrative duties, regularly publishing and obtaining small grants. Both acquired a national reputation. They did research, not because it was required or even expected, but because they had a passion for it. For me, these individuals proved that research could be done at Connecticut College, and they set a standard I wanted to emulate.

Almost certainly, there are similar faculty at your own institution. Seek these people out and ask their advice. If possible, meet with them regularly. Don’t be shy about sharing with them your doubts, disappointments, efforts, and successes.

Understand your students. Recognize that many undergraduate students are bright and capable and motivated, but they are not graduate students. They often have multiple competing interests, including classes, social obligations, participation in student groups, and community service; research may not always be their top priority. Most undergraduate students do not have extensive knowledge in the subject of their research, nor do they possess technical skills that may be necessary for research. Developing background knowledge and technical skills requires time and effort and usually considerable one-on-one attention from you. Take these limitations into account as you plan student projects and your own research.

One limitation of working with undergraduate students is the relatively short time they are likely to be involved in your research program. Many undergraduates do not begin research until their junior or senior year and, consequently, are only with you a semester or two before they graduate. One solution is to select research projects that do not require extensive training, so that students can begin collecting data relatively early. However, this is not feasible for all fields.

Alternatively, get students involved in research early, in their first or second year, so that they have more time to devote to the research. One of my colleagues recruits students early by talking about her
research in every class she teaches, including introductory courses. She encourages students to join her research group early and consequently, has been successful in having students work in her lab for three or four years.

Undergraduate students are used to the clearly-defined assignments, deadlines, and objectives of their undergraduate courses, which are usually laid out in a syllabus at the beginning of the semester. Many are unaccustomed to independent work, where the student must take initiative and where goals and objectives may be broad and fluid. Many undergraduate students will find helpful a research contract, which clearly outlines the expectations of their work, such as weekly hours in the laboratory or library, and expected products of the experience, such as a paper, presentation, or poster. The contract should clearly explain practices, regulations, and laboratory rules you expect them to follow (Monte, 2001). One of my colleagues requires her students to maintain a computer log of their research activities, which she reviews on a regular basis. This provides an effective way to monitor student time and effort and correct any deficiencies early. Experienced faculty at PUIs comment that a required paper is important to successful research experiences for undergraduate students, as it forces students to summarize their research, including its context and conclusions (Craig, 1999)

Another key element in working with undergraduate students is communication. Develop a method whereby students can meet with you regularly. Weekly research meetings are often a good idea, but also tell students how to communicate with you in between scheduled meetings: Should they email you, drop by your office, or make an appointment to see you? Table 1 contains additional suggestions for working successfully with undergraduate research students.

6. Limit the number of your research students. I once had an early-career colleague who would accept 10 to 12 undergraduate students to work in his laboratory every semester, each working on a different project. His doctoral and postdoctoral training had been in large laboratories, where the senior scientist supported several postdoctoral fellows, five to ten graduate students, three or four undergraduate students, and a couple of technicians. My junior colleague was attempting to emulate his graduate mentor. His idea of directing undergraduate research was to assign projects and troubleshoot. He assumed that each student would complete his or her project on their own, analyze the data, and write up the results as a manuscript that could be submitted for publication, with his name as co-author. Obviously, this approach didn’t work. None of the students finished their projects, much less wrote a publication-quality paper that my colleague could submit to a professional journal.

Trying to emulate a large laboratory environment with undergraduate students rarely works. Most students require considerable one-on-one guidance, as least initially. Your research program will be more productive if you spend much quality time with a few students rather than limited time with many.

7. Ask for what you need. Faculty members sometimes assume that chairs and deans will be annoyed by requests for additional resources. My experience has been the opposite: I find that most chairs and deans want their faculty to be successful and will do all they can to help faculty succeed. This does not mean that they are always flush with cash, nor if they have it that they are willing to spend it on trivial or undocumented requests. But most are receptive to carefully explained, reasonable requests to assist faculty with their scholarship. Even if they aren’t able to meet your request immediately, knowledge of your needs may help them procure the resources in the future. Also, don’t assume that administrators can read your mind and will automatically know what you need. You have to ask and justify the request.
Although you should ask for what you need, don’t wait for requested resources to get started. Studies of scholarship at PUIs note that successful researchers often begin with limited resources; their success generates additional resources, which produces more successes, followed by more resources (Doyle, 2000; Enhancing Research, 2003).

8. Collaborate! Collaborations—with researchers at other institutions or those in other disciplines at your own institution—are often the secret to successful research programs at PUIs. Some scholars believe that collaboration is easier to develop and more successful at PUIs because departments and faculties are often small and the lack of administrative structure facilitates interaction with colleagues (Enhancing Research 2003). Regardless of their ease or difficulty, collaborations provide many potential benefits for faculty at PUIs and, indeed, at all types of institutions. Collaborative research is often more productive than research carried out by single investigators; a recent study documents that collaborative research is becoming increasingly common in almost all fields and that team-based research accounts for more high-impact research (Wuchty, Jones, & Uzzi, 2007). For more information on the value of collaboration, see Haase and Fisk in this issue.

While collaborations can contribute to an independent research program by providing efficiency, ideas, and access to advanced instrumentation, early-career faculty should avoid collaborations in which their only role is to contribute to another colleague’s research agenda. A common expectation of tenure is the development of a sustainable, independent research program. Effective collaborations involve a true partnership by all parties.

9. Pace yourself. Perhaps the most important key to long-term success in research is pace. Speedplay, alternatively sprinting and coasting, rarely results in a successful long-term program. Sprinting causes exhaustion and cannot be maintained long-term. Coasting between sprints leads to loss of momentum and requires continual re-initiation of the research program, which is costly in terms of time and effort. Regular, continuous research is almost always more successful in the long run.

In reviewing applications for tenure and promotion, I pay particular attention to the pace of the research productivity. Candidates who demonstrate continuous, steady output of research are, in my view, more likely to be doing research 10 or 20 years into the future than are candidates whose research comes in spurts. In most fields, reinitiating a research program, even after a hiatus of just a few years, can be extremely difficult. One must resurvey the literature, reacquire a sense of the direction of the field, and reestablish contacts with other researchers. Faculty sometimes intend to take a short-term break from research, to catch their breath and later pick up where they left off, but with the heavy and continuous demands of teaching, advising, and committee work at a PUI, many wind up ending their research careers altogether.

How does one maintain a sustainable pace? One aid is to develop a strategic plan that includes short and long-term goals. It is important that the goals be reasonable and that you evaluate them on a regular basis. For many faculty members, this will be a regular and required part of the pre-tenure and promotion processes and of performance reviews thereafter. See Nordell Pearson in this issue for more information about developing a strategic plan.

The nine suggestions discussed above are not the only elements of successful research programs, but they are practices employed by many successful researchers at PUIs and their use can, I believe, increase the chances that you will experience long-term success in your research.

References


### Table 1. Keys to Success in Working With Undergraduate Research Students

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<td>Convey enthusiasm.</td>
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<td>Explain the big picture.</td>
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<td>Require a written report.</td>
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<td>Use a research contract.</td>
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<td>Be an example of good research practices.</td>
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**Benjamin A. Pierce**
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Benjamin Pierce is Professor of Biology and holder of the Lillian Nelson Pratt Chair at Southwestern University in Georgetown, Texas. Ben previously taught at Connecticut College and Baylor University. At Baylor University, he served as Associate Dean for Sciences for six years; he is currently chair of the Natural Sciences Division at Southwestern University. Ben is a population geneticist who conducts ecological and evolutionary research on amphibians. He has authored 33 articles in research journals and three books, including *The Family Genetics Sourcebook*, a guide to genetics for the layperson and *Genetics: A Conceptual Approach*, a widely used general genetics textbook. He has received grants from the National Science Foundation, the W. M. Keck Foundation, the 3M Foundation, the National Park Service, and the National Geographic Society.
The first five years of a tenure-track position present early-career faculty with many exciting opportunities for learning and professional growth in a stimulating academic environment. But, these years are also loaded with the challenges of demonstrating excellent teaching in the classroom and laboratory, contributing new knowledge with an active research program and getting to know colleagues inside and outside your department. This article encourages early-career faculty to create a strategic plan to help successfully navigate these pre-tenure years.

The Value of Planning

The ideas and suggestions, detailed below, stem from my experience in developing and delivering workshops for early career faculty, sponsored by the Mid States Consortium for Math and Science. Many people wonder about the value of spending time planning their career, when they could be spending that time ‘doing.’ After all, we’ve all got more grading, more reading, more writing, more things on our ‘to-do’ lists than we can possibly get done each week. But ask these same people about teaching a new course, writing a research proposal or taking a vacation and chances are they’ll admit to having done some careful, thoughtful and time-consuming planning to get the desired results. For a course, they may describe creating a weekly or even daily plan for the entire semester including learning goals and skills development for their students. For a proposal, they probably spent months gathering relevant background information, assembling preliminary results and creating an experimental plan for the remaining work. The trip preparation included choosing a destination, scheduling dates, making reservations, and packing the car. And after all that, they may describe a class, a research project or a trip filled with both good and bad surprises and some funny, exciting, frustrating or expensive experiences along the way. Like a new course, a proposal or a vacation, your career is something that deserves thoughtful, creative and strategic planning and such planning will help you achieve the outcomes you desire.

Creating a Plan

Thousands of books and articles have been written on the value of planning and the practical aspects of creating a plan. Dahl (2003) and Time Management from Harvard Business Essentials are just two of many good resource books. Project Kaleidoscope has an extensive website with many resources for faculty members on career planning. Among many effective approaches to planning, I have found it easiest and most useful to break the process up into four different stages: vision, goals, strategies and actions. This planning framework can be used in almost any setting including individual, group, professional, and personal planning, but in this case, I’ll be primarily addressing individual career planning, especially for early career faculty. For those of you interested in creating such a plan, I recommend finding a quiet place where you won’t be interrupted for at least an hour, and with a notepad and pencil, begin brainstorming about these stages.

Stage 1: Vision

Start by creating a vision statement for your career. A vision statement is almost always future-looking and it can be more ‘dreamy’ or philosophical than a goal. Ask yourself these questions. Who am I? What do I value? What are my strengths and talents? What are my passions? In the next decade, what would you like to become, accomplish, or contribute in your professional life? Take some time to craft a vision for yourself that, as Covey (2000) suggests, “becomes a personal constitution, the basis for making … decisions in the midst of the circumstances and emotions that affect our lives.”
Stage 2: Goals

Napoleon Hill said “A goal is a dream with a deadline.” The next step in creating your strategic plan is to brainstorm some dreams. Given that most faculty members are evaluated on the three areas of teaching, scholarship or research, and community service for tenure promotion, you may want to divide your goals into these three categories. You may also want to craft your goals according to several time frames; the next year, the next 3 to 5 years and the next decade. Your goals may relate to promoting a challenging and supportive learning environment for students in your classroom and lab, making significant contributions to your field of research, or using your gifts to benefit the campus community. However you craft them, make your goals specific, personal, ambitious and realistic.

Stage 3: Strategies

Once you’ve got a start on identifying your goals, begin thinking about several strategies that will help you reach them. A strategy is a mechanism for accomplishing your goal. Ask yourself how you’re going to get from where you are now to the realization of your goal. Do you need to gather information, get training, secure funding, establish collaborations or seek expertise? Many of your strategies will likely be practical ideas that may be standard and conventional ways to approach your goal. This isn’t bad; often ‘tried and true’ methods work well. But give yourself the freedom to design creative, unconventional or innovative strategies, too. Planning a variety of strategies will likely keep you energized and interested as you work toward your goals.

Step 4: Actions

Finally, once you’ve identified several strategies for each goal, fill in three or four concrete action items under each strategy. An action is something practical that you’re going to do to make progress toward each strategy, such as phone a colleague, attend a workshop, read a manuscript, or schedule an appointment with your department chair. Add a timeframe to each action such as, this month, in the next 3 to 6 months, within the next year. These timeline reminders will help you stay on course as you use your plan. Again, be ambitious but realistic. Don’t set yourself up for failure by expecting that you’ll complete all your action items in the first month.

The example below may be most relevant for a faculty member in the first year of a new tenure track position. Clearly someone who has already spent a year or more getting a research program established may have the same goal but will likely have different strategies and actions.

Goal 1: My goal in the next 3-5 years is to create and sustain a vibrant research program.

Strategy 1 (3-9 months): Organize and set up my research space so I can begin experiments with one or two students.

Action a (1-3 months): Unpack and organize my boxes of equipment that are currently stored in the lab.

Action b (1-3 months): Meet with my Department Chair to discuss how to use my start-up funds to purchase a new X.

Action c (3-4 months): Discuss recruiting students at a department meeting and with my mentor.

Action d (3-9 months): Recruit one or two students to work with me to set up the new equipment and run some preliminary experiments.

Strategy 2 (12-24 month): Secure external funding to support the research program.

Action 1 (1-3 months): Meet with the Sponsored Research Officer (SRO) on my campus to discuss potential sources of external funding for my research ideas. Note: if my campus doesn’t have an SRO, meet with the Dean or my Department Chair.

Action 2 (1-3 months): Ask colleagues for copies of both successful (funded) and unsuccessful proposals. Read these proposals and discuss the reviewer comments with the PI if possible.

Action 3 (3-6 months): Meet with the SRO again to gather information and advice on specific programs, their requirements and deadlines. Decide on one or two programs and study the program descriptions.

Action 4 (9-18 months): Prepare and submit a proposal.
Using your Plan

One of the most encouraging comments we got from one of our summer workshop participants was, “Just having to articulate my goals and plans has been helpful. I would like to shape them into something that I actually use, rather than it becoming just another ‘nice idea’.” This comment reveals the all-too-common fate of many of the plans we create. Even those of us with the best intentions let the plans get buried under piles of exams, or mail, or current literature, never to be seen again. How can you avoid this fate with your plan? My first suggestion is that you print your plan on brightly colored paper and pin it to the bulletin board right above your desk or tape it to the wall right inside your door. You may even be able to fit a copy of your plan in your daily planner or calendar. Wherever you put it, make it visible so that you’ll see it often!

Secondly, share your plan with at least one other person, preferably two or three people. Share your plan with a mentor, a colleague in your department or another junior faculty member. Perhaps you can even convince a colleague to do this planning exercise together, thereby creating a natural planning partnership. If someone else knows about your plan and you give them permission to comment on it, chances are much higher that in 6 months or a year from now it will not just have been another good, but now forgotten idea.

Third, use your plan in connection with your calendar. When your plan is fresh, make some notes on your calendar that correspond to action items in your plan. Remind yourself of upcoming deadlines, calls, emails and appointments that you need to schedule to your list each week and carry them over to the next week if you don’t get them done. On your calendar, schedule a minimum of 30 minutes each month to revisit your plan. To make this review more appealing, take yourself out for coffee or lunch with your plan and your calendar. Spend that time reviewing action items you’ve accomplished and progress you’ve made and make notes in your calendar about next steps.

Fourth, use your plan as a reference when making decisions. If you’re asked to serve on a search committee, give a seminar, review a book or a manuscript, or be a co-PI on a proposal, take time to see where this opportunity may fit into your plan. Evaluate the opportunity realistically in terms of the time it will require and whether the benefits associated with it are worth the costs. Consult your calendar to remind yourself of upcoming deadlines and other commitments you’ve already made. Maybe this new opportunity is perfectly timed to help you accomplish part of your plan and you can eagerly accept. However, that may not be the case. While this new opportunity may be very appealing to you, resist the urge to over-commit yourself if you’ve already got a full schedule. Remember, you can decline a request graciously, indicating your interest, while acknowledging that the timing isn’t right. Chances are a similar opportunity may come your way again.

Lastly, recognize that your plan is a living document that needs the flexibility to be reshaped as circumstances change. Upon review, you may realize that a large section of your plan needs revising based on information you’ve gathered or an unexpected opportunity. That’s fine! Embrace the plan’s flexibility, but don’t abandon whole sections lightly. Review major changes in your plan with a mentor or colleague. Ask for their input and suggestions. They may have experience with a situation that’s blocking your progress and they may be able to steer you in a different direction.

Dealing with Setbacks

As John Dewey reminds us, “Failure is instructive. The person who really thinks, learns quite as much from his failures as from his successes.” Nobody’s perfect; we all make mistakes. But that’s not the point; it’s what we learn from those mistakes that helps us reshape our future. When you realize you’ve made a mistake, take some time to think about what happened and let that mistake be instructive. With respect to your plan, you may fail to meet some of the deadlines you set, or fail to follow through on some of your strategies or actions. Ask yourself, “why?” Were the strategies not realistic, not well-conceived, or poorly timed? Be honest; was the strategy sound, and were the actions reasonable, but you procrastinated? Whatever you determine...
may have been the cause, don't stop there. Take time to reshape your plan and get back on track. Meet with your mentor or another colleague with whom you’ve shared your plan and ask them to help you negotiate the set back and move forward. You may discover that through a failure, your reshaped plan is stronger, more interesting and more likely to help you accomplish your goals than it was prior to the mistake.

Integrating the Rest of your Life into your Plan

In my experience, the single most challenging aspect of being an early-career faculty member is finding time for all the other things we want to do outside of work. It's easy for your work to consume 12 or more hours each day, even on the weekends. Whether it's meetings, grading, writing, reading, research, course preparation, search committees, conferences, or administrative duties, there is almost a long to-do list staring up at us from our desks or day planners. When is there time to have a meal with friends, exercise, go to a concert, play with your kids, volunteer at a local charity, repaint the basement or take a vacation? The answer is simple; you’ll make time for the things you value. I know that’s easier said than done, but the sooner you begin living by that principle, the sooner you’ll find yourself making time for your ‘life’ outside of work. While the plan I’m encouraging you to create is largely a professional plan, I strongly recommend making it a more complete ‘life’ plan. Put these other ‘life’ commitments on your calendar even before you fill in the work-related items. If getting regular exercise is important to you, put it on your daily or weekly calendar and find an exercise buddy. If being home for dinner with your family is important, be vigilant about minimizing your work-related evening commitments. There may be weeks or even months where you feel pretty balanced, but don’t be surprised if there are weeks when you feel buried by something unexpected. Using your strategic plan as a ‘life’ plan may help you navigate these pre-tenure years more successfully.

Good luck as you navigate these early years as faculty members. These are exciting years for you and I hope you approach your work with humor, humility, and passion. If you do, these pre-tenure years will probably be more productive and enjoyable that you might have hoped.

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Karen Nordell Pearson is an Associate Professor of Chemistry at Lawrence University in Appleton, Wisconsin. In 2006, she began serving as the Director of the Midstates Consortium for Math and Science (MCMS, www.mathsciconsortium.org), a 13 member Consortium founded by the Pew Charitable Trusts. In July 2007, Jeanne Narum of the Independent Colleges Office and Project Kaleidoscope and Karen led a workshop for about 40 early career faculty, postdocs and graduate students sponsored by the MCMS. The weekend provided the participants with time to create and refine a strategic plan like the one described in this article for their careers for the next 2 to 3 years. In addition, this article was influenced by several wonderfully supportive mentors who challenged Karen to set ambitious goals, prioritize her commitments and stay disciplined in her time management. Karen is on leave at Hope College in Holland, Michigan, where in addition to her work with the Consortium, she is doing some teaching and directing Hope's Research Experience Across Cultures at Hope (REACH) summer research program for high school students.
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Researching African American Studies on a Predominantly White Campus: Research Tools That Work at Eastern Washington University

Eastern Washington University is a liberal arts state university located in Cheney, a small rural community, eighteen miles south of Spokane in eastern Washington. The University offers over 80 baccalaureate and over 40 master’s degrees and a doctorate in physical therapy, to a student enrollment of about 10,000 (primarily undergraduates) with 5% students of color.

Eastern’s School of Social Work and Human Services is subdivided into five disciplines: the Africana Education Program, Alcohol and Drug Studies, the Center for the Studies on Aging, the Chicano Education Program, and the School of Social Work. The Africana, American Indian, and the Chicano Studies comprise the University’s three autonomous, ethnic studies programs that provide such services as recruitment, specialized study, support, and retention for the growing student body and its specific co-cultures. Although the enrollment of students of color is relatively small in number, students of color account for only 12% of the student body, Eastern is the only institution in the State of Washington that has retained separate and independent programs to meet the specific needs of those outside the dominant co-culture.

The African American Education Program offers five or six courses each quarter. The four most popular classes are Introduction to African American Culture, Early African American History, 20th Century African American History, and African History. The average class size for these courses is typically 135 students with an average of six or seven African American students in each. These numbers have held true to form over the past fourteen years.

In light of such student demographics, I have found that engaging my students in various research assignments has proven to be a time-tested and viable means to facilitate their entry into the arena of African American Studies for the first time in their academic careers. The purpose of this article is to examine the dynamics of five specific in-class research projects and to identify their relative outcomes that I have observed over the past 14 years of teaching at Eastern Washington University.

The Task at Hand: Assisting Students in Overcoming the Limits of Their Cultural Background Through Research

For a majority of my students, participating in a class on African American Studies is their first occasion of confronting issues of race and self-awareness from a new-found historical context. This new and unfamiliar exercise in scrutiny and critical thinking brings to light the need to personally explore and personally verify incongruencies previously left unexamined. This is where the role and principles of research can benefit and serve students in exploring a discipline that seems to undermine and perhaps even invalidate their previous knowledge-base.

There are at least five identifiable areas or obstacles that are common and universal for a majority of my students: 1) the need to gain an understanding with regards to the role of perspective in the matters of race; 2) identifying assumptions and presumptions about the African American experience; 3) confronting simplistic conclusions that are founded on stereotypes; 4) defining the role of the media in dictating one’s assessment of America’s race relations, and 5) acknowledging the impact of conflicting worldviews outside those belonging to the dominant culture.

Practical implementation of this model is extremely “user friendly.” First of all, this research approach requires no special funding on behalf of instructors in order to sustain it. There are no extra expenses for students, outside the typical printing costs of their papers and brief book reviews readily available on the Internet.

The role of faculty, as will be developed in the upcoming sections, is primarily that of a research facilitator within the classroom setting. Each project is predicated on the instructor providing crucial points of historical and theoretical contexts and potential controversies as well as specific examples of past projects and research tools readily accessible to the class. Student recruitment is executed via a strategically-written course description that emphasizes the principles of “journey” and “exploration” into intriguing themes involving race relations and potential policies of resolution. Students are readily interested.

The role of the student within this research model is that of the customary learner at the college level. Research can be adequately conducted during typical study hours outside of the classroom during the quarter or semester. Access to adequate resources works in favor of the students since all required information is readily available at a college or university library and via the Internet.
1. Research: Addressing Race and the Role of Perspective

The background for research in this area is centered first in raising the students’ awareness of the four basic and major schools of history. I usually employ two weeks of class time to explain how scholarly articles and books typically fall into four classifications or categories of historical thought: the Progressive School, the Consensus School, the New Left School and the School of Social History.

A majority of the time is taken in lecture and discussion to see the impact of historical context upon publications: the reform-minded era of the 1920s produced historical pieces composed with the focus and theme of group conflict (the Progressive approach); the era of conformity and cold war apprehension of post-World War II produced publications that reinforced a very strong and conventional pro-American theme (the Consensus School); the turmoil and upheaval of the 1960s produced publications that sought to question, scrutinize, and even undermine the American status quo and the conservative slant of conventional history (the New Left School); and finally, the era of the mid-1970s and the rise of the ‘Me’-generation gave birth to publications that focused on biographical and social histories to provide a more investigative theme (the School of Social History).

With this background in mind, my students are then presented with a research project to explore the role of historical context and perspective upon historical books or articles: The Comparative Book Review Analysis. This task involves selecting a book of any significance related to African American history and locating two book reviews of contrasting viewpoints. The students are then to critically analyze each article and identify its appropriate school of historical thought, citing excerpts that justify their conclusions. For instance, with Alex Haley's Roots, students may typically find an Afrocentrist review (New Left) that wholly endorses Haley’s findings in contrast to a conservative review (Consensus) that scrutinizes Roots with a tone of suspicion and disapproval for some of its unverifiable conclusions.

The value of research in this exercise comes to light as students see firsthand for themselves the impact of perspective upon an individual’s assessment and conclusions regarding issues of race. The volatile and controversial nature of U.S. race relations is perceived now with a richer sense for deeper critical thinking and investigative inquiry.

2. Research: Addressing Common Assumptions and Presumptions Regarding Black Leaders

The role of black leadership in the struggle for racial equality is a helpful field for enhancing students’ research skills. The background necessary to engage students in this respect begins firstly with an exploration into the wide range of leadership theories. Part of the assignment, as an additional task that I have found more suitable for upperclassmen or honors students, is to require a preliminary treatment and summary of leadership theory in general – with an emphasis on the debate over the individual versus the environment in light of leadership formation.

Next, as a common objective for the general class, it is helpful to set the parameters for the subjects of the research journey, entitled as the Foundations of Black Leadership Project. I typically present my students three options to chose from, ideally gaining their sense of ownership into the project that is soon to become their own: 1) A Comparison of Dr. Martin Luther King, Jr. and Malcolm X; 2) A Comparison of W.E.B. DuBois and Booker T. Washington; and, 3) A Comparison of John Hope Franklin and Molefi Asante. These three counterparts provide numerous areas of rich contrasts for the exploration into leadership formation. The task is first launched by reviewing with the class the general assumptions and presumptions commonly held about each leader in most conventional circles. Much discussion and consideration is given to this aspect in order to create an investigative aspiration in each student and to propel them into the research ahead.

At this point, setting the parameters of the research task is appropriate. This aspect consists of seven fields: 1) Family Background and Socio-Economic Status; 2) Specific Social Setting of the Individual; 3) The Role of Faith; 4) The Role of Education; 5) Targeted Audience/Followers; 6) Ideology for Combating Racism; and, 7) Leadership Style and Methodology. With an expectation to synthesize and defend their conclusions, students typically enter into a deeper level of analysis by researching these elements.

The value of research in this regard is multifaceted. The impact of institutional, social, and internal forces upon visionary leaders facing racial oppression seems to take on a new level of appreciation within the students. Rather than being told so through lecture or an assigned reading of a given book, they are allowed to discover for themselves the complex and sophisticated formative influences that shaped African American leaders at various junctures of our history. Rather
than just seeing the individual, students grow to apprehend the depths beneath the surface of assumptions and presumptions that only personal research can render.

3. Research: Addressing Simplistic Conclusions Regarding Race-Sensitive Issues

The primary objective in this research task is to increase the student’s level of self awareness in relation to emotional topics involving race. Research, in this regard, enables the student to objectify the subjective; at least, for the moment. By giving way to more rational thinking based on various research practices, I hope to foster a student’s ability to listen and learn about the "whys" behind African American reactions and aspirations and that this may enhance more constructive cross-cultural interaction and exchange.

The pursuit of this endeavor involves a Summary-Comparison Analysis in which the student selects from three options provided: 1) Affirmative Action and Higher Education; 2) African Americans and Slavery Reparations; and, 3) The Debate over Ebonics in Oakland's Public Schools. These topics surface an array of feelings and reactions among undergraduates today. In preparation for the research assignment, I generally spend whatever amount of time I deem necessary to ensure that the class as a whole understands the underlying issues embodied in these matters: equal access to opportunity, remedies for racial discrimination of the past and the present, white privilege, validation of one’s cultural identity, and the impact of race in American society.

The research task consists of locating articles from scholarly journals and periodicals that provide a stark dichotomy of positions on the topic chosen. The student is to summarize each narrative, provide a personal critique of the strengths and weaknesses of each, and finally, compare and contrast the two articles. They should also provide background information on the orientation and frame of reference of the journal’s publishers and any pertinent information of the same with regards to the authors of the articles.

The research value that I have observed in this exercise has been encouraging. Students routinely express an appreciation for the journey itself, regardless of whether it changed their viewpoint or not. The important outcome is that they have taken the time to step back and examine their own belief system against the backdrop of scholarly analysis and observations; ending up, hopefully, less inclined to digesting simplistic overtures of complicated issues that so often encompass U.S. race relations.

4. Research: Addressing the Impact of the Media upon U.S. Race Relations

This research task involves preparing the class to first see that much of our interaction with those racially different from us is based on our being conditioned by common and widespread misperceptions – misperceptions often conveyed through the media. Without much need for me to solicit or facilitate discussion, students typically volunteer a wide spectrum of views in this regard. Topics tend to center on the African American association with urban crime, poverty and welfare misuse, drug abuse, black rage, dysfunctional families, and educational shortcomings.

Whereas the media may present the African American in an unfavorable light, the challenge within this research assignment, Race Images: An Annotated Bibliography, involves an abbreviated literature review in search of the documented truth. Students initially develop the topic of their choice with an opening section (two or three pages) explaining the intent of their research. Then the key is to pursue significant references, on both a macro- and micro-level, that would address the actualities of the theme selected. For instance, the over-representation of African Americans in the prison system, along with the racial discrepancies in sentencing, could open up observations on a much deeper level than mere statistics and quantitative findings; the same with facts on the history, application, and impact of affirmative action in higher education. Notations that justify the reference’s selection would further demonstrate the student’s apprehension of the literature.

The research value in this case is found in the student’s journey from mere images and impressions provided through the media to verifiable truth and conclusions. By reference compiling and highlighting, the student can be impressed with the breadth and width of an issue previously conceived from a much narrower viewpoint. Again, the potential for better and improved dialogue on issues of race is enhanced from my observation in the past.

5. Research: Addressing Race and the Diversity of Worldviews

The primary objective in this research assignment is to familiarize the students with an awareness of conflicting life-paradigms that impact the quality of communication between races. Frequently, the divisions and chasms that exist within today’s U.S. race relations are tied into the simple yet subtle inability to understand each other. Because such
misunderstandings produce various levels of suspicion and mistrust, it is imperative for students to grasp the differences in worldview as conveyed in the ideologies of Afrocentrism and Eurocentrism.

This research assignment, Afrocentricity and Eurocentricity: Value Systems in Conflict, is designed to walk students through the basic African American dilemma articulated by W.E.B. DuBois as the controversy of “double-consciousness.” How to reconcile being both black with Afrocentric tendencies and also American with Eurocentric assumptions? Students are to define and identify in history these two sharply contrasting worldviews as well as address DuBois’ basic query of “Can I be both black and American?” I typically will suggest additional research into the ideologies of Dr. King and Malcolm X for the sake of greater clarity and insight. This question posed by DuBois touches the essence of what constitutes a black integrationist and what constitutes a black nationalist.

The research value inherent in this assignment is the students’ impression of their new-found awareness of the impact of worldview upon race relations today. They feel they are able to understand on a new level the role of an individual’s frame of reference and its motivating power to produce ideologies and consequent action and behavior. Now the issue of race interaction has taken on a whole new tone as a result of investigative inquiry and research. Students are more receptive to challenging their own reference points as well as to learning about and accepting the resulting, consequential lifestyle of others.

Conclusions
My experiences in using research and issues of race have been quite rewarding as an educator. In many situations, volatile topics in the arena of race and racism can tend to cause students to close off and hide behind reinforced and entrenched concepts and conclusions. This common obstacle seems to be minimized by approaching the subject from its separate parts rather than from its “raw whole.” Themes along the lines of the role of perspective, unexamined assumptions, oversimplified conclusions, the media’s influence, and the impact of one’s worldview appear to disarm students of their unconscious, defense mechanisms.

A second major observation relates to the critical importance of the classroom atmosphere. Once students feel that they are in a safe environment – a setting where all divergent thoughts and beliefs are accepted and embraced on the same level – there seems to be an unspoken license to step forward and explore new levels of critical thinking. Facilitated by the appropriate research exercises, students enter into a self-directed, self-disciplined, self-monitored, and self-corrective level of thinking, which is the essence of critical thinking. The outcomes most evident are enhanced communication and problem-solving abilities accompanied by a commitment to overcome native egocentrism and sociocentrism. Arriving at any new level of this state, personally as well as academically, is most satisfying for all involved.

References

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The first international Institute will be hosted by Malaspina University-College in British Columbia, Canada from June 5-7, 2008.

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This workshop will bring together teams of three to five faculty members and administrators from institutions that are interested either in initiating an undergraduate research program or in institutionalizing existing research activities. The three days will consist of plenary lectures presented by facilitators associated with CUR interspersed with individual team meetings with CUR mentors. The teams will begin the workshop by meeting with their facilitator and reflecting on the current status of undergraduate research on their campuses. This inventory will include the examination of institutional strengths, as well as the obstacles currently preventing achievement of desired results. After this assessment, the teams will begin formulating mission statements, goals, and action plans for their own institutions. The event will conclude with the teams discussing their plans with the entire community. Throughout this process, the facilitators will be engaged with the teams in order to assist them in discussions and deliberations. Teams typically consist of at least one academic administrator, one or more department chairs, and several interested faculty members. The Institute is open to academics from all fields. To apply for the Institute, please visit http://www.cur.org/institutes/malaspina.html and complete the on-line application.

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Professional meetings used to be just for academics and industrial scientists. Today, however, the presence of graduate students is expected, and it is increasingly common to see undergraduate students attend. For example, the schedule of a typical ACS National Meeting can be very intense, with dozens of talks and multiple poster sessions held during the week. Because the lectures and poster presentations are directed toward the professional audience, undergraduate students struggle to understand the jargon and often miss the major points of the presentation. At best, undergraduate listeners might pick up the flavor of the research, perhaps some sense of why it is important and what the approach is, but precious few of the details.

We report herein our attempt to help our undergraduate research students glean more from professional meetings. We have devised and piloted a system that we believe is widely applicable and hope that others will find it worth emulating.

As part of our multi-site NSF-REU program, a group of six faculty members and twelve undergraduate students have been attending major national meetings focused on organic chemistry for several years. After the second year of our program, K. C. Russell noted the mismatch between the level of our students and the level of the presented lectures. To remedy this discrepancy, he proposed conducting informal meetings called “Undergraduate Context Sessions,” that would allow undergraduates to interact with our faculty after each day’s lectures. These question-answer sessions would help students clarify the various concepts from the talks, thus providing them with a greater appreciation for the science presented, and an overall richer experience of the professional meeting.

The first of these sessions was implemented at the Sixth International Symposium on Functional Pi Systems, so-called “F6,” at Cornell University in June of 2004. The format proved to be extremely successful for several reasons. First, there were very few undergraduates in attendance aside from the twelve research students from our group. This made it easy to advertise the event and encourage our own students to attend. Second, lecture sessions were scheduled for mornings and afternoons. This allowed us to meet during the evenings after dinner without missing any of the lectures. Third, the topic of the meeting had a narrow focus – organic electronic devices. Because lecturers used the same set of acronyms throughout the conference, the information students learned in the first Context Session could be applied in subsequent lectures, giving rise to a greater understanding of the lecture material and allowing the students to ask increasingly sophisticated questions as the week progressed.

The format of the Context Sessions at F6 was quite straightforward. We instructed our students to write down confusing topics and vocabulary that were presented during the lecture sections. Then, the students and faculty gathered during the evening and discussed the questions and topics posed by the students. We held Context Sessions each night of the symposium, and the students’ understanding of the session lectures continued to improve each day of the conference.

Pleased by the success of the Context Sessions at F6, Ron Brisbois and Dave Reingold attempted to duplicate the format at the National Organic Symposium (NOS) held in Salt Lake City in June of 2005. Unfortunately, we were unable to recreate the learning environment that developed at F6. There were several reasons we can identify for the Context Sessions not working well in this attempt. First, it was an “off year” for our REU site. As a result, fewer undergraduates at the meeting traveled under our direct supervision, so there was no built-in base of students from which to build. Second, it was difficult to advertise the Context Sessions at the NOS; we did not have a good means of reaching the other undergraduates present, so only a few of them knew about the context sessions. Most important, the NOS holds its talks during the morning and evening, with afternoons off. We scheduled our context sessions for mid-afternoon during which many people took advantage of the delightful Utah weather to hike in the vicinity. Thus, it should have been no surprise that, for each of two afternoons, we had fewer than five people show up for our discussions.

We tried again two years later at the 2007 National Organic Symposium at Duke University. We were pleased by this success and attribute it to several factors. First, our REU site was active again, so we had a built-in population of six faculty members who brought more than a dozen undergraduates to the meeting. Second, we held only one session on the second night of the symposium, so there were two days of pent-up questions waiting to be answered. Third, the session was at 5:00 PM,
directly after the afternoon activities. Fourth, Pfizer was kind enough to sponsor the session and provide pizza and soda for the attendees. Finally, and most important, we had the full support of the program chair, Professor Andrew Evans of Liverpool. Professor Evans not only arranged for the Context Session to be advertised in the conference booklet, but he also made attendance mandatory for the 15 faculty and 40 students who received conference travel awards. As a result, we had over 60 people in attendance, and entertained numerous questions from students and faculty. A few graduate students also joined us. After collecting an array of questions, the moderator asked who wanted to answer one. Most astonishingly, the first volunteer was an undergraduate student who attempted to explain EPR. This got the whole session off on a very positive note, and there was active participation from both students and faculty. One of the students who volunteered to answer questions actually worked for the speaker whose presentation inspired the question in the first place. Almost every faculty member present took a turn at answering a question. The session had the added benefit of helping the faculty get to know each other better. Many students and faculty reported that the session was extremely useful.

Despite this success, we believe that Context Sessions can be improved and plan to implement some ideas at the 2009 NOS in Boulder, Colorado. For example, there were undergraduate students and faculty at the 2007 NOS who did not receive travel grants and, therefore, were not required to attend our session. More important, they were unaware of the Context Session. In addition, many of those who did attend did not know ahead of time what the purpose of the session was, so there were fewer prepared questions than might have been expected. We have ideas for better publicity, such as advertising it on the screen in the lecture room before each talk, and posting information on-line during registration for undergraduates and faculty bringing undergraduates. Since the faculty members who attend NOS and bring students are often the same from year to year, we believe this problem will be partially alleviated by faculty telling their students what to expect. We also believe that we can do a better job of explaining the session in pre-conference communications.

In summary, we believe that Context Sessions are a great way to help students get more out of the plenary lectures at major national meetings as well as to provide undergraduate faculty an opportunity to interact with each other. We highly recommend that other groups adopt them. With proper advertising in advance of the meeting and requiring travel awardees to attend, a critical mass of undergraduate students and faculty can provide for an enriching experience for students and faculty alike.

**David Reingold**  
H. George Foster Professor of Chemistry  
Juniata College  
Huntington, PA 16652

Dave Reingold received his undergraduate degree from Dartmouth and his PhD from the University of Oregon. After a postdoc at the University of Alberta he began his teaching career, which has taken him to Haverford, Middlebury, Lewis & Clark, and currently Juniata College, where he is the H. George Foster Professor of Chemistry. He has served CUR as a councilor, as chair of the Chemistry Division, and as chair of the Finance Committee and was named Volunteer of the Year in 2001. He has mentored over 80 students in his research labs, 13 of whom are now themselves faculty. He has also authored a textbook on organic chemistry for freshmen.

**KC Russell**  
Department of Chemistry  
Northern Kentucky University  
Highland Heights, KY

KC Russell received BS degrees at Oregon State University in chemistry and biochemistry. In 1992 he received his PhD from the University of Arizona. He then traveled to Strasbourg, France to work under the tutelage of 1987 Nobel Laureate, Jean-Marie Lehn. Russell returned to the US to work as a post-doctoral fellow at Columbia University and began his academic career in 1995 at the University of Miami, Florida. In 2001 he joined the faculty at Northern Kentucky University to focus on teaching and research with undergraduates. He received the Outstanding Junior Faculty Award in 2004 and was promoted to associate professor in 2005. His research interests center around the synthesis of enediyynes and annulenes. He is an avid tennis player and helps coach the NKU varsity teams. When not on the tennis court Russell and his family enjoy geocaching.

**Ronald G. Brisbois**  
Professor of Chemistry and Department Chair  
Macalester College  
1600 Grand Avenue  
St. Paul, MN 55105

Ronald Brisbois moved to Macalester College in September 2000, after teaching for eight years at Hamline University and for two years at Davidson College. Since initiating his independent faculty career, he has worked with 79 undergraduate research students, mentored 3 Preparing Future Faculty graduate students, and advised 5 post doctoral assistants. Research in the Brisbois group focuses on the development of new synthetic methods, total synthesis of small molecules for chemical genetics studies in
Arabidopsis thaliana, synthesis and characterization of cyclopentadienyl-Co-cyclobutadienyl derived cyclophanes and dehydroannulenes, and design of ligands for constructing supramolecular self-assemblies, chiral catalyst candidates, and fluorophores as potential dyes and/or light-emitting materials. He has served on the NSF-MPS and NSF-ERE advisory committees, as well as twice contributing to the triennial review of the NSF Chemistry Division. In 1993 President Clinton designated him as a Presidential Faculty Fellow.

Nancy Mills
Professor of Chemistry
Trinity University
San Antonio, TX 78212-7200

Nancy Mills teaches chemistry at Trinity University where she has established a research program examining the preparation and characterization of antiaromatic species, with funding from NSF, PReF Research Corporation, the Dreyfus Foundation and the Welch Foundation. For her work with undergraduate students, she received one of the CUR Fellow awards in 2006 as well as the award for Distinguished Achievement in Scholarship at Trinity University in 2007. She received the Z.T. Scott award for teaching in 1992 and was named a Piper Professor of the state of Texas in 1999. She is currently developing a course on the chemistry of crime for non-science majors.

Tom Mitzel
Chemistry Department
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Tom Mitzel was born in South Dakota and received a BS from Northern State University. He received his PhD from Boston College under the tutelage of Larry Scott in the area of Homoconjugated Hydrocarbon Cage Structures. From 1994-1996, he worked as a post-doctoral researcher for Leo Paquette at The Ohio State University focusing on "Stereochemical Control of C-C Bond Formations under Environmentally Benign Conditions". Tom joined the Chemistry Department at Trinity College in Hartford, Connecticut in 1996 where he continues to study homoconjugated systems and electron rearrangement reactions with an enthusiastic group of undergraduate researchers.

Kathleen Mondanaro
Visiting Chemistry Professor
Metropolitan State College of Denver
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Kathleen R. Mondanaro was an associate professor of Chemistry at Saint Michael's College (VT) until June 2007. Currently, she is a Visiting Professor of Chemistry at Metropolitan State College of Denver. Research interests include the synthesis of theoretically interesting molecules containing the bicyclo[1.1.1]pentyl moiety as well as the synthesis of carbon nanotubes. Mondanaro earned a PhD in chemistry from the University of Pennsylvania in 1998, an MA in theology from Saint Michael's College in 2007, a BA in Chemistry from Bard College in 1988, and an AAS in Nursing from SUNY Dutchess Community College in 1984. She now resides in Denver with her husband, puppy and four parrots.

Jeffrey Katz
Chemistry Department
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Jeffrey Katz became fascinated by organic chemistry while working with Amos B. Smith III as an undergraduate at the University of Pennsylvania and as a graduate student at Harvard University working in the laboratories of David A. Evans. He began teaching chemistry at Colby College in 2002 and has established an undergraduate research program focused on the synthesis and applications of oxacalixarenes. His work is currently funded by Research Corporation, the Petroleum Research Fund, and the National Science Foundation.
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Academic investigation lives, by definition, on the frontiers of knowledge. New information and advances in technology change our research questions and methods; new theoretical perspectives challenge our assumptions; increased interdisciplinary collaboration brings us new partners and opens new avenues of study; and new political and pedagogical contexts demand that we offer expanded research opportunities to more of our students. And yet, with all that is new, we have many of the same old devils on our tail: time, money, institutional politics, student preparedness. The theme of this conference is the exploration of current conditions and future possibilities in undergraduate research, but we invite all of the presenters to be explicit about the ways that they encounter and address the real logistical challenges entailed in their projects.

2008 Conference Sub Themes
Undergraduate Research and Scholarship in Arts and Humanities
Assessment of Research Outcomes
Beyond the Academy: Real-World Applications of Research Results
Early Involvement in Research
Research in a Global Environment
Undergraduate Research in the Interface of Disciplines

Workshops
Poster Sessions
Interactive Sessions
Dr. Isiah M. Warner  
on Mentoring Diverse Students  

Isiah M. Warner received his BS in chemistry from Southern University (1968); his PhD from the University of Washington (1977). He was assistant professor at Texas A&M University (1977-82), promoted with tenure in 1982. He joined Emory University (1982) as associate professor and named Samuel Candler Dobbs Professor in 1987. He joined LSU as Philip W. West Professor of Chemistry in 1992. He has been actively involved in the development of new educational strategies through grants from the Howard Hughes Medical Institute, the National Science Foundation, and the Research Corporation. The overall focus of these efforts are (1) restructuring the way students learn science and (2) development of a vehicle for extending educational/mentoring efforts such that the overall impact of a single individual is magnified, i.e. a mentoring ladder. His educational models are based on the effective implementation of metacognitive and research strategies through the use of this mentoring ladder.

Dr. Jennifer Blackmer  
on Undergraduate Research in the Humanities  

Jennifer Blackmer is a freelance playwright and director, and an Assistant Professor of Theatre at Ball State University. Her most recent play, The Human Faustus Project, written with fifteen undergraduates at the Virginia B. Ball Center for Creative Inquiry, premiered at Ball State in November, and was also seen as the opening session for the Council on Undergraduate Research Dialogues conference in Washington, D.C. Her current projects include On Again with Fresh Courage, a new play about Anne Frank that also premiered in November at the Children's Museum of Indianapolis, a new English translation of Morimoto Kaoru’s A Woman’s Life (with Guohe Zheng), and Delicate Particle Logic, a play about physicist Lise Meitner, for which Jennifer won a creative arts grant from Ball State University.

Dr. Paul Apostolides  
on Community-Based Research  

Paul Apostolides, the Judge and Mrs. Timothy A. Paul Chair of Political Science at Whitman College, conducts community-based interdisciplinary research with undergraduates. He is a highly regarded scholar whose most recent work has focused on the experiences of Latinos in Washington State. One of his students was quoted at Commencement as saying, “Professor Apostolidis’s efforts at creating a community-based learning environment at Whitman are unparalleled. His courses over the past several years have integrated teaching and scholarship in a manner that allows his students to enhance their learning through meaningful practice.” Apostolidis’s class in Latinos in Washington was cited for compiling “groundbreaking research that academics and lawmakers throughout the state found to be vital.”

Please visit www.cur.org/conferences/csb/cur08natconf.asp for conference details and information on registration.

Reconstructing Pasteur’s 1853 account of his peculiar three-component crystals confirmed the identities of the two crystalline phases as ammonium (+)-bitartrate and a quasiracemate of ammonium (+)-bitartrate/(-)-bimalate. A crystal structure of the quasiracemate shows that (+)-bitartrate and (-)-bimalate components organize in approximate inversion related molecular assemblies with each bitartrate and bimalate component forming homomeric catemeric motifs. The bitartrate strand is isostructural in the quasiracemate and (+)-bitartrate phases, and likely serves as the primary structural contributor to the intergrowth of these crystalline phases. Kraig Wheeler is an associate professor of chemistry. Rebecca Grove participated in this research during her sophomore year at EIU, and is currently a junior chemistry major. Collaborators Ray Davis (professor of chemistry emeritus) and Scott Kassel (associate professor) are at the University of Texas at Austin and Villanova University, respectively. This research was supported by ACS-PRF, NSF-MRI, and an EIU seed grant.


This study prospectively examined behavioral risk factors for youth soccer injury. Sixty 11- and 12-year-old boys who played on six teams in a suburban recreational soccer league were followed over the course of a season. Greater skill and less experience playing soccer best predicted injury risk. Inhibition, aggression, and risk-taking did not emerge as predictors. David Schwebel is an associate professor of psychology. Mark Banaszek and McCall McDaniel were psychology and biology majors, respectively. For Mark, this research was conducted as part of his honors’ thesis. For McCall, the research was conducted for her pre-med curriculum. The work was funded internally through UAB Department of Psychology and School of Social and Behavioral Sciences funds. Mark Banaszek is currently in the MA program in Counseling at the UAB School of Education. McCall McDaniel is in medical school at Louisiana State University.


The texture and microstructure of copper during annealing processes is greatly influenced by the presence of twin boundaries, which are not only a result of, but also a cause of grain growth at low temperatures. This study demonstrates experiments using electron backscattered diffraction on equal channel extruded high purity copper, where samples were examined at various plastic strain levels. The undergraduate student, Laura Bradford, who performed these experiments, received her BS in Materials Science and Engineering from Washington State University in May 2007. This work was part of her senior thesis advised by associate professor David P. Field, using instrumentation acquired as part of the NSF Instrumentation for Materials Research program.

Rose RW, Vorobyeva AG, Skipworth JD, Nicolas E, Rall GF. Altered levels of STAT1 and STAT3 influence the neuronal response to interferon gamma. *J Neuroimmunol*. 2007;192:145-156. (Arcadia University)

As immune responses in the CNS are highly regulated, cell-specific differences in IFNγ signaling may be integral in dictating the outcome of host cell responses. In comparing the IFNγ-treated primary neurons to control MEF, we observed that neurons expressed decreased levels of signal transduction components and demonstrated distinct response kinetics to IFNγ. These observations may reflect modifications in the IFNγ negative feedback loop, which may provide a mechanism for the cell-specific heterogeneity of responses to IFNγ. R. Wesley Rose is an assistant professor of biology at Arcadia University. Anna Vorobyeva is an undergraduate biology major in her senior year at Arcadia University who participated in this project during the summer and into her senior year as her senior thesis project. Jason Skipworth is a laboratory technician at the Fox Chase Cancer Center. Emmanuelle Nicolas is a Research Scientist at the Fox Chase Cancer Center. Glenn Rall is an associate member in the Viral Pathogenesis program at the Fox Chase Cancer Center. The research was funded by grants from the National Institutes of Health to RWR and GFR.
This study examined the effects of volcanogenic CO2 and SO2 on the frequency of leaf stomata in common swordfern. We found that stomatal index is lowest at sample sites where concentrations of both CO2 and SO2 or SO2 alone are much higher than background. Therefore, we propose that decreases in the stomatal index of fossil leaves may record transient atmospheric increases in both SO2 and CO2, such as may be caused by the large eruptions of flood basalts that are associated with major extinctions. Lawrence Tanner and David Smith are associate professors of Natural Systems Science. Amanda Allen participated in the study in 2005 for independent study credit. The research was supported by a grant from the NSF Integrative Plant Biology program. Amanda has since graduated with a degree in biology, is employed, and is applying to graduate programs.


Experience-dependent plasticity in the mushroom bodies of the solitary bee Osmia lignaria (Megachilidae). Dev Neurobiol. 2008;68:73-82. (Whitman College)

Withers GS, Day NF, Talbot E, Dobson HEM, Wallace CS. Experience-dependent plasticity in the mushroom bodies of the solitary bee Osmia lignaria (Megachilidae). Dev Neurobiol. 2008;68:73-82. (Whitman College)

The present study examined the characteristics of nicotine, the principle ingredient in tobacco, in a conditioned taste aversion paradigm in rats. Nicotine was shown to produce a significant aversion of a novel substance that had been given to the rats soon after nicotine administration (i.e., a conditioned taste aversion). Interestingly, a pre-injection of nicotine 90 minutes prior to pairing a nicotine injection with the novel substance prevented a nicotine-induced conditioned taste aversion. Thus, tolerance to nicotine was quickly developed after only one treatment. Adam Prus is an assistant professor of psychology at Northern Michigan University. Amy Maxwell and Kevin Baker are both senior psychology majors at Northern Michigan University. John A. Rosecrans and John R. James are both professors in the Department of Pharmacology and Toxicology at Virginia Commonwealth University.

The research was supported by the Northern Michigan University Psychology Department. Amy and Kevin are applying to graduate programs in Experimental Psychology.


This research describes a biochemical and molecular characterization of NEMO, a cellular protein involved in the NF-kB signaling pathway, which regulates key steps in immune responses and cellular growth. This research test hypotheses about how experience affects the organization of the insect brain, examining brain development in a solitary bee species, O. lignaria, as these bees become foragers. The volume of the mushroom bodies, a brain region thought to be involved in learning and memory, increases significantly as these bees become experienced foragers, similar to previous findings in the honey bee. This is the first study to test for such brain changes in a solitary insect, and these findings suggest at least some common brain mechanisms, e.g. neural plasticity in the mushroom bodies, occur in association with foraging behaviors and are independent of social regulation. Associate professors Ginger Withers and Christopher Wallace and professor Heidi Dobson of the Biology Department collaborated with undergraduates Nancy Day, Biology ('05), and Emily Talbot, Bio/Environmental Studies ('05), who conducted this research as part of their senior theses. Nancy is currently a graduate student in the Neuroscience Program at the University of Minnesota, and Emily is attending nursing school. This work was funded by an NSF CAREER award to Withers, and by support from the Keck Foundation to the Whitman College Biology Department.


The paper described the design and testing of an inexpensive 16-channel potentiostat that is both controlled and powered by a PC multifunction data acquisition card. As an enabling example, the novel potentiostat was used to measure the extent for which insoluble manganese oxide powder will pre-oxidize ascorbic acid in a phosphate buffered saline solution. This technique to reduce electroactive interfering species has recently been reported to be useful for enzyme-based electrochemical sensors. This work was supported by a Research and Disciplinary Grant from Bloomsburg University. Mark Tapsak is an assistant professor of chemistry and Paul Goode is an industrial collaborator. Jamie Houseknecht participated in the research for more than a year both as a volunteer and for credit. He is currently working for Becton, Dickinson and Company on biosensors while also attending the University of North Carolina part time as a chemistry graduate student.


This research describes a biochemical and molecular characterization of NEMO, a cellular protein involved in the NF-kB signaling pathway, which regulates key steps in immune responses and cellular growth. The human gene encoding the NEMO protein is also mutated in some inherited immunodeficiency diseases. This paper identifies certain
The capacity of synanthropic flies to serve as mechanical vectors of Cryptosporidium and Giardia, pathogens of humans and other vertebrates, was studied using fluorescent in situ hybridization (FISH) and immunofluorescent antibody (IFA) techniques. All three fly families studied were shown to be competent vectors among beef cattle, dairy cattle, horse, sheep, and wildlife populations in a 10-km-radius area of Berry College’s 26,000-acre laboratory. Bruce Conn is professor of biology and dean of the School of Mathematical and Natural Sciences. Jennifer Weaver, a junior biology major, participated in this project as a student researcher funded by an NSF-REU grant (DEB0354017), with additional support from the Johns Hopkins NIEHS Center in Urban Environmental Health. Jennifer is currently pursuing a master’s degree in environmental management at Duke University. 

Christopher Taborsky authored the article as a senior music education major at the State University of New York at Fredonia. He discusses implications of the research and makes suggestions for future work. The project was part of an honors thesis supervised by H. Christian Taborsky, assistant professor of music education. Taborsky is currently employed as a music teacher at Pine Tree Elementary School in Monroe, NY.

Amanda Grohosky is a senior psychology major at Rice University. Kathleen Moore is a Research Assistant Professor and Ezra Ochshorn is an Information Specialist at the University of South Florida’s Louis de la Parte Florida Mental Health Institute. The research project was supported by a National Science Foundation (NSF) grant that funded a program entitled Research Experience for Undergraduates (REU) during the Summer. Amanda was accepted into the program and completed her program during the Summer of 2006. Amanda is currently a senior psychology student and is applying for graduate programs in school psychology.

In this article, we report for the first time on the copper (Cu$^{2+}$) binding characteristics of the far-red fluorescent protein, HcRed, from Heteractis crispa. Anal Biochem. 2007;370:60–67 (Indiana University Purdue University Indianapolis)
Professor in the Department of Chemistry & Chemical Biology, Tanushree Banerjee was a Chemistry major who participated in this research for independent study credit. The research was supported by IUPUI and a fellowship to Tanushree from IUPUI Undergraduate Research Opportunity Program. Tanushree is in a graduate program in Chemistry at the Virginia Commonwealth University.


Animal populations often differ in the average size of their offspring, but the mechanisms responsible for these differences are not well understood. This study of the marine snail *Nucella ostrina* examined the role of maternal allocation of nurse eggs and fertilized eggs to egg capsules in controlling interpopulation variation in offspring size among nine isolated populations. The study revealed that most of the differences among populations in offspring size are due to differences in the number of nurse eggs allocated per egg capsule by the mother. Louis Gosselin is an associate professor of biological sciences. Michelle Lloyd was a senior biological sciences undergraduate student at the time of her involvement in this project (2004-2005). Michelle carried out all the field and laboratory work and was the lead author of the paper. This was an independent research project supported by an Undergraduate Student Research Award (USRA) awarded to Michelle by the Natural Sciences and Engineering Council (NSERC) of Canada, and the project was also supported by an NSERC Discovery research grant awarded to Louis Gosselin. Michelle is employed as a biology instructor at the Bamfield Marine Research Centre and has applied to begin a graduate program next fall.

Martin DL, Fried B, Sherma J. Effects of increased salinity on survival and lipid composition of *Helisoma trivolvis* (Colorado strain) and *Biomphalaria glabrata* in laboratory cultures. *Veliger*, 2007;49:101-104. (Lafayette College)

High performance quantitative silica gel thin layer chromatography-densitometry was used to study the effects of increased salinity on the lipid composition of the digestive gland-gonad complex (DDG) of two medically important freshwater snails. Both species survived an increased salinity up to 20% for up to two weeks and showed no changes in the concentrations of major neutral and phospholipid classes compared to control snails maintained in distilled water. These results have implications for the spread of larval trematodiasis to endemic areas where salinities may be elevated. Joseph Sherma is Larkin Professor Emeritus of Chemistry and Bernard Fried is Krieder Professor Emeritus of Biology. Danielle L. Martin, a 2006 BS-Biochemistry graduate who had three earlier coauthored papers published, was supported by the Lafayette College EXCEL Scholar Program and a Camille and Henry Dreyfus Foundation Senior Scientist Mentor Program award to J. Sherma. Danielle is attending Yale University in the Molecular Cell Biology, Genetics and Development track of the Biomedical Science PhD program.


Contamination profiles of organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs) were determined in six fish species from three selected regions along coastal waters off Savannah, GA. Concentrations of PCBs were predominant (12-493 ng/g lipid wt.) followed by PBDEs (10-337 ng/g lipid wt.) and OCPs such as DDTs 2.7-153 ng/g lipid wt., chlordane (3.8-34 ng/g lipid wt). The results indicated no region specific difference in the contaminants, however inter-species as well as intra-species differences were evident. The levels of PCBs and OCPs in fish from coastal waters off Savannah, GA were below the Food and Drug Administration (FDA) established limits for human consumption. Kenneth Sajwan and Joseph Richardson are professors of biological sciences at Savannah State University (SSU). Bomman Loganathan is an associate professor of environmental chemistry at Murray State University. Kurunthachalam Senthilkumar is a research associate at SSU. Suresh Nune is a chemistry graduate student at MSU. Annette Fowler is a chemistry undergraduate senior at MSU. Annette participated in this research particularly in PBDE analysis part of this major project during the last spring and summer of her junior year. The research was supported by the US National Park Service, Department of Interior and MSU’s McNair Scholar Program (Annette Fowler’s assistantship).
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