CUR Quarterly **June 2004:**
Creating Time for Research
Vignettes

Spinning Straw Into Gold

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Franklin and Marshall is a small undergraduate liberal arts college where teaching is the predominant activity of each faculty member. As a biology department with majors in biology, biochemistry and molecular biology, and the neurosciences, we are also committed to including a hands-on laboratory component with almost every one of our course offerings. This translates into a considerable amount of faculty time spent in organizing laboratory sessions, implementing new experimental teaching protocols, searching for appropriate journal articles and web sites, ordering supplies and maintaining equipment. Consequently, at the end of a typical day, starting experiments on your own research project is sometimes the last thing you have the inclination to tackle. Additionally, many of the tasks involved in an active research program cannot always be accommodated by the relatively small free-time blocks a busy teaching schedule dictates. On the bright side, however, demanding teaching activities often result in substantial interactions with a significant number of talented students who are eager to make the transition from a primarily didactic laboratory experience to engagement in an actual research project. Taken together, these circumstances present a golden opportunity for an individual faculty member to create more time for research.

In our department, molecular genetics is an upper level core course with 60-70 students divided into 24 student laboratory sections that meet 4 hours per week. Currently, I team-teach this course with the primary professor and I am responsible for development of the laboratory curriculum. Within this framework, the course laboratory has recently been transformed in both scope and content from a conventional teaching format into a fully investigational research laboratory. At the core of the new design is a restructured syllabus where the standard schedule of individual experiments and weekly topic changes has been replaced by a semester-long project that is integrated into the instructor's research program. Concomitantly, students begin the semester by working in small groups on background information in the primary literature, databases and web sites related to the research field. They continue to collaborate throughout the project to discuss theoretical questions, prepare experiments and analyze data.

During the past semester, for example, each student participated in a semester-long research project on mitochondrial genetics: "Application of molecular techniques for the detection and identification of mitochondrial DNA mutations in monozygotic twins discordant for neurodegenerative disease". In this project, each pair of students investigated the mutation profile for a specific mitochondrial gene using PCR-RFLP fingerprinting analysis and subsequently cloned the gene from a particular twin sample for future sequencing studies. Experimental data analysis and interpretation were carried out via a background literature study, a written laboratory paper, small two to four person group discussions with the instructor, an individual oral presentation and an extensive take-home final examination. The specific laboratory techniques performed by each student included PCR primer design and amplification, DNA restriction digests, agarose gel DNA electrophoresis, digital image data processing, cloning in bacterial cells with plasmid DNA and blue-white screening and selection of clones for further sequencing analysis.

This golden opportunity to devote more time to research can be personalized to the specific needs of the individual faculty member: 1) the laboratory design is completely flexible and can be customized to the criteria of each particular course, 2) the research topic can be expressly coordinated with course content, student abilities, time constraints and the instructor's interests, 3) the research project can span part of or the entire semester, according to the instructor's discretion, 4) the experimental techniques employed in the course are de facto state-of-the-art and 5) the time and effort applied to the course laboratory actively contribute to the instructor's main research agenda.

Together, both faculty and students reap numerous benefits. Within this context, teaching commitments complement and extend faculty research initiatives rather than deflect from their limited resources and additional undergraduate student research opportunities are created. As a further reward, fresh student perspectives often significantly enhance the breadth and success of the research program.

In our course we have spun "straw into gold" together with our students for the past several years and we all have thoroughly enjoyed the experience.

Time Saving Through Institutional Collaboration
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My colleague Thor Hansen (Western Washington University) and I have incorporated a research component in our undergraduate invertebrate paleontology classes that stems from our own ongoing research and that includes a transcontinental student collaboration.

For the past fifteen years, Thor Hansen and I have studied the geologic history of predation by naticid gastropods (moon snails), which attack other mollusks by drilling holes in the shells of their victims. In order to interpret the fossil record of naticid drilling, more information is needed concerning geographic patterns in drilling by modern moon snails. Towards this end, we collected mollusk samples during June 2003 from 28 beaches from Maine to Florida.

This past fall, as part of their course requirements, students in our invertebrate paleontology classes became participants in our research program. With our direction, students processed the modern beach samples and collected data on species diversity and naticid drilling. Teams of students at Western Washington and University of North Carolina, Wilmington (UNCW) who worked on samples from the same beaches shared data with their "paleontology pen pals" on the other side of the country. Each team analyzed the data they and their pen pals had collected in order to test hypotheses about the geographic distribution of naticid drilling in the modern environment. UNCW students also compared the modern beach samples to a fossil assemblage from North Carolina to test hypotheses about environmental conditions of the fossil assemblage. In both courses, students wrote term papers discussing the results. UNCW students also prepared PowerPoint talks that were presented at a mini-symposium in the course at the end of the semester.

In order to model the research process for the students, I wrote two abstracts for poster presentations, on which each class member was listed as a coauthor. These papers have been accepted as poster presentations at the March 2004 meeting of the Southeastern Section of the Geological Society of America. Several students will travel with me to Tysons Corner, VA, to present the posters. Support for student travel has been provided by the UNCW Undergraduate Research and Travel Awards program, which this year was supplemented with a generous contribution from the Chancellor’s office.

These data will contribute to the long-term collaborative research Thor Hansen and I have been conducting for the past 15 years, and which has resulted in numerous publications. Data from the modern samples studied in our classes will help us understand the patterns represented by our database of nearly 150,000 fossil specimens spanning a time period of about 80 million years.

References

Kelley, P.H., E.J. Bjorkland, C.L. Buford, K.A. Cooke, C.R. Perry, D.A. Poirier, and T.A. Wales. Paleoecology of the Waccamaw Formation (Plio-Pleistocene) of North Carolina: an actualistic approach. *Geol. Soc. America Abstr. Prog*. 36.

Kelley, P.H., R.M. Bohn II, A. Cook, D.J. Gridley, C.R. Haugstad, R.A. Lewis, and B.L. Morris. Prey selectivity by naticid gastropod predators within the Waccamaw Formation (Plio-Pleistocene) of North Carolina. *Geol. Soc. America Abstr. Prog*. 36.

Curricular Change Can Benefit the Mind, Body, and Soul

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The Challenge: Teaching is the primary focus at Capital University; it is heavily weighted in the promotion and tenure process and it is a selling point of the institution. Consequently, faculty members have comparatively heavy teaching loads, 12 credits per semester, in addition to senior theses and independent studies, for which there is no compensation. One recommendation following an external review of the Behavioral Sciences Department (psychology, criminology, and sociology) was to reduce teaching loads, permitting more time for student-faculty research collaborations. Ha! A reduction in teaching load was not on the horizon. The department decided to explore the road not taken.

All of the department courses were three credits (with the exception of four 1-credit seminars designed to build a community of learners at each level of the curriculum). Thus we taught at least four courses per semester and often more than that due to the department's continual need for adjunct instructors. Knowing we could not reduce the number of credit hours we taught, we decided to reduce the number of courses that we taught. We changed all of the courses from three credit hours to four credit hours. In order to achieve this, we had to make some difficult compromises.

Compromises: First, we cut courses from the curriculum. For example, within the psychology major, the assessment course was removed and the material from that course was integrated into other appropriate courses such as Clinical-Abnormal Psychology, Counseling Psychology, Statistics, and Developmental Psychology. Second, we increased the number of credit hours required for the majors, although this was partially offset by cutting courses. As a result, the psychology and criminology requirements increased from 35 hours to 42 hours and the sociology requirement increased from 35 hours to 38 hours. The corresponding minors increased from 18 to 20 hours. Third, we were flexible in scheduling the fourth hour so that it did not interfere with other courses that students need. Fourth, we were sensitive to other departments that require behavioral science courses for their majors. To address this concern, we require the additional fourth hour of Psychology 110 and Sociology 110 only for behavioral science majors.

Benefits: Faculty response the first semester was overwhelmingly positive! Each of us had one less course preparation. We avoided increasing class sizes and therefore each faculty member also had approximately 25 fewer students to supervise, 100 fewer exams to grade (4 exams X 25 students), and 25 fewer papers to read, etc. We were surprised at how much extra time this gave us each week.

Unintended Benefits: For most of the courses, the fourth hour is devoted to reading and understanding primary research articles appropriate for the course content. This means that our students get more experience working with research material and are better prepared for conducting independent research. In addition, the process of reviewing the curriculum allowed us to ask difficult and important questions about the three majors and the corresponding minors as well as student learning outcomes and departmental goals, and as a result, we have strengthened the program.

Overall Assessment: The number of students within the three majors of the department has remained constant. Comments by graduating students during the transition indicated that they were “jealous” of the younger students who would experience a better education than they received. That is, students perceived the curriculum change as appetitive, not as aversive! Faculty within the department appreciated the additional time to work on their own scholarship and to supervise undergraduate research activities. However, we continue to struggle with when to schedule the fourth hour for the courses. Faculty outside the department claimed that by reducing our workload what we did was not “fair” – they envy our courage to make the change and the free time we have earned as a result. We have encouraged our colleagues to consider similar changes in their departments; sadly, too many of them highlight reasons why they could not make such a change rather than considering the curricular, student, and personal benefits to reconfiguring their own majors.

Conclusions: I am thankful that the department did not get caught in battles over turf and that we managed the change as a unified entity. Such a spirit of cooperation is an important quality that permitted a successful evolution of the curriculum and of the department, which as led to increased student and faculty research endeavors.

Creating Time for Undergraduate Research in Psychology at a Liberal Arts Institution

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The last job advertisement for our tenure-track position read that the successful applicant "…must demonstrate a commitment to excellence in teaching and undergraduate research." Our institution's appreciation for both teaching and research seems ideal until you learn about our four course per semester teaching load. Can we really commit to undergraduate research with such a heavy teaching load without sacrificing the quality of our teaching? Yes, and how our department achieves this balance is quite simple. We integrate our research into an undergraduate advanced research course.

The Advanced Undergraduate Research Course

Establishing an undergraduate advanced research course benefits our students, our faculty, and our department and university. This course is built into our curriculum as one of the "Capstone Experiences" required by our seniors. Students identify a lab matching their research interest then (with permission) register for it. Although the class primarily involves hands-on participation in research, it still has clear objectives, a syllabus, and paper / reading requirements. The goal is to provide a teaching environment where students learn specific research techniques and skills. Currently our department supports neuroscience, animal behavior, and social and cognitive development labs all of which involve undergraduate students.

Benefits for the Students

Students learn the basics of psychological research including experimental design, data coding, and data analysis. However, because of the teaching environment of our labs, students are incorporated even more fully into the milieu of research. They learn the processes involved with work submissions, publications, and poster presentations at conferences. Furthermore, students can directly demonstrate their interest and abilities in research. This often earns them stellar and meaningful letters of recommendations from their lab professors. Students describe the mentoring relationships with faculty as invaluable.

Benefits for the Faculty

Treating research as a course benefits faculty both personally and professionally. Because this course counts as one of our four courses, time is now specifically scheduled for our research. Thus, we do not have to worry about "finding" time to do research. The obligation that we feel toward this course and our students motivates us to keep our lab active, generate new research ideas, and stay current in our area of specialization. A side benefit of our advanced research course is the opportunity to mentor our students on a level simply not possible in a classroom-only environment. Sparking a student's interest in research and enhancing their educational goals is undeniably rewarding.

Benefits for the Department and the University

Allowing faculty at a liberal arts teaching institution to use a course to do research communicates to the faculty that research is valued and supported. Implicit in this support is that quality research is expected. Quality research brings recognition both to our department and to our university and draws much stronger faculty and student applicants. This model also fosters a real sense of energy within a department. Students and faculty converse in the halls about the research they are doing; there is a real buzz when labs prepare for papers and presentations. Psychology departments from other liberal arts universities have actually taken field trips to our department to see what psychologists do!

Why this Works

There are several reasons why this advanced research course model works for us. First, research is only one of our many "Capstone Experiences." Only those students interested in research or graduate school participate in this course. Other options, such as internship, study abroad, and senior service learning are available to students whose interests are in applied fields. Due to this abundance of options, our department does not have an unmanageable number of students participating in research.

Second, because of the diverse interests of the faculty, not everyone in our department is interested in running and supervising a lab. Those professors who really shine in the traditional classroom are free to use their four-course load toward traditional psychology classes. Thus, most of our major courses are covered.

Finally, this model works because our university has the interest and resources to support it. Our department was supported when we decided to create an advanced research course. We also have a university research grant agency that helps faculty and their departments with the costs of lab set-up and maintenance.

Establishing an undergraduate research course has created an ideal set-up for all involved. Our faculty members are happy with our courses and we feel supported in our course choices. Our students receive a tailored educational experience and they highly value their research participation. Our university is excited about our work and the exposure it brings. Given the far-reaching benefits of this advanced research course model, we recommend adopting it to create time for faculty research in other liberal arts institutions and departments. We filled our tenure-track position quite easily with a candidate who is a strong teacher and researcher. Why wouldn't we? We have a department that offers the best of both worlds.

Teaching, Research, and Family at a Small, Comprehensive Southern University

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I teach political science in the College of Liberal Arts at Mercer University which is a small, but comprehensive University, here in Macon, Georgia. I teach anywhere between 21-27 hours in any given academic year not including summer school. I also have three small children and a wife that are constantly vying for my attention. However, over the course of the past five years, I have managed to produce a book, several published articles, a handful of teaching simulations, and have taken several groups of students to conferences in the discipline while overseeing a number of senior projects. How do I balance these demands?

Simple. My department, specifically my department chair, is sensitive to the needs of our faculty. Every year when our chair builds the schedule for the following year it is with an eye toward getting the most from each member of our faculty and keeping them happy. He also asks for our input when creating such a schedule, which is quite refreshing considering I had no input at the previous institution I worked.

How does this relate to me? In any given year, I teach from 9:00 a.m. to 12:00 p.m. or 1:00 p.m. the latest, head to the library to do research or work with my students on their research projects for several hours, pick up the kids from school, and head home for dinner with the family. In a small department of four, personality and collegiality are highly valued. In addition, it helps that we all have different schedules when we want to teach, i.e., I teach in the morning, two other colleagues teach mid-morning to mid-afternoon, and our chair usually teaches late morning until late afternoon. This way we maximize the number of courses we teach without overlapping and still have a significant block of time to work with our students on their research projects or to do research on our own. For example, this semester I am working with a colleague in the department on an intro to government textbook which we hope to have ready for the fall and I am overseeing two senior projects, one of which has been completed, all the while teaching 13 hours. It sounds like a lot, but with a little care and flexibility, we are all able to have the schedules that fit our needs and personalities, which is an enormous perk.

I am not advocating that you run right into your chair's office and demand the perfect schedule but I do encourage anyone who wants a better schedule to sit down with their chairs and colleagues and think of ways you can maximize your time teaching, research, and time with your families. You just may be surprised by the results.

Creating Time for Research
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As a child I laughed at the story of the rabbit looking at his watch commenting that he was late for a very important date. He raced off looking back and forth, oh my, oh my, where had the time gone? It always seemed so funny someone rushing around trying to catch up with time. I admit I laughed until I became a faculty member and then oh my, oh my where did my time go? Many institutions of higher education require faculty to be effective teachers, make time for research and provide a wealth of service to both the institution and community. With all these tasks to juggle, faculty members find a lack of time as being a substantial impediment to their research productivity. Because of this frustration of balancing time between all these areas, institutions have to be creative in their efforts to help faculty find time for research.

Lamar University (LU) in Beaumont, Texas and its College of Education and Human Development have collaborated to create time for undergraduate research. This initiative has come to fruition through the widespread efforts of faculty. This support for "research time" is part of a Faculty Workload policy to provide release time for faculty members. Release time can be earned and banked somewhat like a savings account to be used when the faculty chooses. Faculty members earn workload units each semester for their work beyond what has been considered regular workloads. These units are then banked into the faculty's tally of "Banked Units". Just like someone saves up to buy an item they want to purchase, faculty members are able to "save up" their release time units. When a certain number of units are collected, a quarter release time can be bought to pursue research endeavors.

This initiative began when faculty expressed concerns of the growing demands of the job and limited time for research. Even with the support for release time for research there were roadblocks to overcome. Discussions on what would constitute the banking values to be earned for each activity were hotly debated. After many meetings from representatives throughout the college, departmental meetings and a college-wide meeting of all faculty, a final plan was approved and put into place.

Faculty members are excited to have this option to earn units for release time. Many have taken new attitudes toward research and are discovering ways to support students in their research efforts. The point system encourages them that the university and college understand their need for time by providing the opportunity to earn release time for this endeavor. It is exciting watching the release time “Banking of Units” growing larger and yielding more dividends. Both faculty and students benefit from this policy.

Another way to earn research time is through the LU Research Enhancement Grant program. Faculty members campus-wide are encouraged to submit research grants twice a year. These grants focus on proposals that include students in their research projects. Faculty members are encouraged to involve students in a number of ways throughout their research endeavors. One section, “Involving Students”, is a key component in the call for proposals. Twenty plus grants are awarded each year by the university’s Research Council. These grant projects can be used to purchase quarter-release time and / or student assistants to work with faculty on a wide range of research and creative activities.

An example of a currently funded Research Enhancement grant includes student assistants as well as members of the Lamar Student Research Organization (LSRO). The goal of this grant sponsored by Dr. Kimberly Griffith and Dr. George McLaughlin is to mentor and encourage student research at Lamar University as well as around the globe. The E-Journal Development grant is being implemented to design and monitor a peer-reviewed electronic student research journal. Members of the LSRO have been involved with Griffith and McLaughlin in several aspects of this project. The electronic student research journal, which will be “up and running” by this summer will include research articles written and submitted by students at Lamar and across the globe.

Lamar University is finding ways to support faculty by providing time for research. Through these types of programs faculty have more time and money to help them include students in their research efforts. When faculty members have time for research, everyone benefits. Research helps faculty to be effective teachers. Students in turn benefit from knowledgeable and current faculty. Although our lives are still somewhat like the rabbit running late for his very important date, we are finding more time to do research and less time to worry about getting it done!

Assigning Time for Faculty Research The College of Business and Economics at CSU Fullerton

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Without resources and rewards, performance expectations have limited value. In 1984-85 the College of Business and Economics at CSU Fullerton addressed the need for supporting faculty research efforts by establishing assigned time for research. In June 1986, support for faculty research was included in a College Strategic Plan. In February 1989, the College Senate approved a Faculty Development Program. This program represented a significant increase in support for faculty research. A key feature of the program is that it rewards faculty whose research has resulted in peer-reviewed journal articles. Since 1989 the program has been modified and strengthened. One important modification was the addition of teaching innovations as an area of support. In the Faculty Development Plan, faculty may propose such innovations, which can be supported by assigned time, either from the College or from one of our six academic departments. Teaching innovations are supported on a prospective basis, while research is supported retroactively (that is, one must publish before one is given the assigned time).

Assigned Time Allocations, School Level

There are four categories of activities at the school level that are considered for assigned time.

They are:

1. Refereed publications. These awards are retrospective in that they are based on actual published work in refereed business and/or economics oriented publications. The purpose is to provide faculty the time for additional research and publication. The faculty member is required to provide a reprint or a letter of unconditional acceptance from the journal editor. Resources permitting, faculty providing evidence of one or more significant, refereed publication(s) will receive between three and six units of assigned time.

2. Curricular innovations. These awards are prospective in that they are based on future activities. The purpose is to improve the school's academic programs as opposed to an individual course. Examples of supported activities include developing innovative

teaching methods, developing (and publishing if appropriate) cases, outcome assessment, etc. Faculty proposals must detail what is planned, a timetable for accomplishment, and how the activity will benefit students' and/or the school's academic programs. After reviewing the categorical proposals, the Budget Committee may grant release time for the academic year to faculty submitting approved projects. Normally, a maximum of three units per faculty member will be granted.

3. Funded grants. These awards are prospective and/or retrospective. The "prospective" assigned time award is designed to assist faculty in developing and writing a major grant proposal to be funded by an outside source. In addition, as part of grant proposals, faculty may include assigned time as a part of the school's share of institutional support.

4. Professional involvement. These awards may be for prospective, retrospective, or on-going activities. The purpose is to provide faculty time for significant professional endeavors. Examples of supported activities include journal editor; chair, national conference local arrangements committee; major office holder, national academic organization; etc. Faculty engaged in these types of activities must provide evidence of involvement. After review by the Budget Committee, up to six units of release time may be granted for the academic year.

Workload and Work Distribution:

To be eligible for preferential teaching schedules, faculty must submit a Faculty Development Plan. When making graduate teaching assignments and workload adjustments, Departments will weigh the extent to which faculty are actively involved in research. The goal is to ensure currency in the classroom that is built on on-going involvement in published research as well as in paper presentations at national professional meetings. Consideration for adjustments in workload to account for University committee service is given.

Normally, lecturers are expected to concentrate their efforts on instructional activities. However, the school recognizes that appropriate scholarly and creative activities, including publication, increase all faculty's expertise within business and economics disciplines and thus enhance teaching in those disciplines. Consideration for adjustments in workload and its distribution is given to lecturers actively involved in business and economics related research and publication.

Integrating Research and Teaching Labs with the Module Evolution Approach

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The difficulty of balancing the competing time demands of teaching and research are familiar to all CUR members. Like many of us, I try to make my time do double duty by attempting to integrate teaching in my upper level Molecular Genetics class with my research interests in DNA repair mechanisms in the yeast *Saccharomyces cerevisiae*. Since I have complete control over these labs, I have written my own lab manual each year so that the students do projects that are important to my research while also allowing them to learn important techniques in the field. In the past I found that integrating class labs with my research interests took a tremendous amount of effort because I had to substantially rewrite my lab manual every year in order to keep the projects in the class labs current with my research needs. In order to reduce this burden, I have adopted what I call the module evolution approach. In this approach, the labs are arranged as a series of modules, each introducing an important technique. The description of the technique we are performing and the general structure of the labs remains the same each year, but the particular problem we are using the technique to solve can change each year, thus the modules may evolve with each iteration of the manual.

The Southern blot lab illustrates the way the module evolution approach works to reduce my writing burden while still introducing students to this technique and allowing them to participate in my research. In my research lab we produce many yeast strains in which we delete particular genes important for DNA repair. I have my Molecular Genetics students confirm the gene deletions by Southern blot. Each year the general outline of the lab remains the same:

Day 1: Make genomic DNA from wild-type and putative mutant strains and cut with restriction endonuclease.
Day 2: Separate DNA fragments by agarose gel and blot to filter.
Day 3: Hybridize and wash blot, image results by colorimetric detection method.
Each year the skeleton of this lab is the same, the only thing that changes is the particular gene we examine. The students must use bioinformatics techniques to pull the sequence of the gene from a database and predict the fragments that we will see on the Southern blot from the wild-type and mutant strains, then decide whether their results indicate that we have the mutant strain or not.

The module evolution method works if there are techniques routinely performed in your research lab. Currently, I have a 4-5 lab module on producing a recombinant plasmid, a 1-2 lab sequence using the polymerase chain reaction (PCR), the Southern blot module, and 1-3 labs focusing on bioinformatics. All of these techniques are things we need to do often in the research lab, and it is always easy for me to think of a plasmid I need made, a PCR amplification I need done, or a Southern blot to be performed. I simply update the part of the lab module that describes the particular gene or plasmid we are working with and I am ready for the new semester.

I make sure that the students know that they are doing a piece of my actual research, and I take pains to let them know the entire scope of the project into which their lab projects fit. Student response to being part of my research has been very positive. I have noticed that students are much more careful about their experimental technique when they realize that their results really mean something. (And they do mean something; the 2001 class is acknowledged in a recent publication from my lab for confirming the identity of the mutant strains used in the experiments described in the paper (McInnis et al., 2002).) My student evaluations have frequently mentioned the lab experience as a highlight of the class, and more than one has indicated that these were the most interesting labs they had ever done because they were real research. Thus, I consider the module evolution approach a successful way to integrate students into my own research, while reducing the burden of my lab manual preparation each year.

Reference

McInnis, M., O'Neill, G., Fossum, K., and M.S. Reagan. (2002). Epistatic Analysis of the roles of the *RAD27* and *POL4* gene products in DNA base excision repair in *S. cerevisiae*. *DNA Repair* 1: 311-315.

Making Time to Mentor Undergraduate Research in the Chemistry Department at Western Washington University

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Faculty members in the Chemistry Department at Western Washington University (WWU) feel passionately that undergraduate research is a vital component of the education of chemists and biochemists. As all who are engaged in mentoring undergraduate research are acutely aware, certain factors, and perhaps most importantly, time, are necessary to do this well. The Chemistry Department and WWU have devised three strategies to help faculty carve out time to spend in the lab with undergraduates: differential teaching loads; where possible, teaching assignments that allow for free blocks of time that can be used for research; and competitive WWU project development awards.

WWU is a primarily undergraduate institution of approximately 11,500 students. The Chemistry Department has 17 full time faculty and offers BA, BS, and MS degrees in chemistry as well the BS degree in biochemistry. Although undergraduate research is highly recommended (87% of seniors graduating with the BS biochemistry degree and 62% of seniors graduating with the BS chemistry degree in 2003 had participated in a research project), it is not required for either of the BS or the BA degrees. Those students that participate in research do so either during the summer and/or during the academic year. During the summer, students are either paid from faculty grants, volunteer, or earn course credit, whereas during the academic year, most students earn course credit.

In July of 2000, the Chemistry Department received a six year, $750 K Department Development Award from Research Corporation, which was co-funded by the M.J. Murdock Charitable Trust. Many of the goals of this award focus on providing significant undergraduate research experiences. To achieve this, the concept of differential teaching loads - wherein faculty that are most research active teach, on average, eight contact hours per quarter, while others teach, on average, ten contact hours per quarter - has been implemented by the department. This permits time to mentor undergraduates in the lab, submit grant proposals and manuscripts, and travel to local, regional, and national meetings with students. While this means that teaching loads in the department are not equally distributed, those with heavier teaching loads realize the amount of time needed to develop quality undergraduate research programs and have agreed to this system. As an early career faculty member, this, more than any other single factor, has allowed me the time needed to spend with my research group.

Another way that time is carved out in our department is that when possible, teaching assignments are made to allow for free blocks of time that can be used for research. For example, I have been able to schedule the labs that I teach on the same days that I give lectures. This lets me have a full day during which I have no teaching responsibilities. I make this information available to my research students, and when possible, they schedule accordingly. This permits me to spend a significant block of time in the lab -time which is critical for training new students, offering help to more experienced students encountering difficulties in their projects, and maintaining equipment and instrumentation.

In addition to these departmental initiatives to “create” time, the institution offers a project development award (PDA) program. Begun in 1994, this is a competitive award that is available to all tenured or tenure-track faculty at WWU. Its goals are to allow a faculty member to have both the time needed to obtain preliminary data for a new external grant proposal (not allowed for renewals) as well as to submit that proposal. For the PDA program, a faculty member may either request the equivalent of one quarter of release time (spread out over at least two quarters) plus a summer support grant ($5000), or full salary for two summer months. In addition, funds to hire students, to purchase supplies and reagents, and to travel to meetings may be requested. On average, four to five PDA awards are funded each year, with the average award being approximately $20,000. I benefited tremendously from this program during my second summer at WWU. Funds from this program permitted me to purchase some equipment for the lab, support three full time students and myself for the summer, and to travel to the Protein Society meeting where a student and I presented our results. During this period, we generated the results necessary to submit two grant proposals.

While these three examples of ways to “create” time are those used in the Chemistry Department at WWU, this issue of CUR describes others that may be more appropriate at your institution. However it can be done, it is clear that being able to carve out large blocks of time for research makes the experience more enjoyable, educational, and productive.

Changing Faculty Workload Without New Resources: The Creative Use of Curricular Planning

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The halls of the academy resound with cries for more time. It is one of our most precious resources, yet few of us manage this resource very well. We think simply that there is never enough and plod on, adding more and more tasks to our daily routine. Since we are not going to get more time in a day, it is essential to develop strategies to use our time more effectively.

A recent initiative at Bates College sought to do just this when we implemented a faculty workload project that reduced teaching responsibilities from six to five courses. This was accomplished by gaining greater efficiency through curricular planning.

These changes in course load have had a profound impact on the College. Not only has the course load been reduced providing more time for faculty research, individually and with students; just as important, the process we used to achieve this change created a different approach to problem solving. Now, before assuming the status quo and asking for additional resources for every new initiative, we investigate new strategies, ways of thinking, and distributed leadership for change.

We began this project acknowledging that although we were working to streamline our service commitments, this alone would not gain significant time. And, we agreed that we would not lower our standards for research accomplishments. But a comprehensive analysis of course loads, enrollments, contact hours, and thesis supervision quickly brought into focus the inefficiencies in our curricular offerings, which included many small classes (i.e., fewer than 3 students), the annual addition of many new courses, and an often ineffective class schedule. Given the worry that attaches to any prospective change, it was important to benchmark the data across the college and across a comparable group of colleges to document national and disciplinary workload standards and expectations. For example, how would labs (science or language based) be “counted” or how would large classes be recognized? The resulting database was essential to understanding the problem. And it provided the kind of objective description of the environment that allowed us to acknowledge the range of variation inherent in the disciplines.

With the problem delineated, we turned our attention to finding solutions. Three challenges guided our work:

- Inefficient use of time undermines our intellectual and academic success.
- Curricular planning can be used to lower course load.
- Even positive change is hard and must be managed.

We set about this project by asking each department to develop its plan for reducing the number of courses while maintaining an excellent curriculum, and operating fairly. In creating these annual course plans, the department had to meet a set of parameters that established college norms for what “counted” as a course, identified targets for department contributions to college-wide curricular offerings such as general education, and maintained the college mission as its focus. Establishing criteria for success rather than demanding a particular way each department must act, acknowledged the variability inherent in the disciplines, built on the strengths of the faculty, and placed the leadership for change at the level at which change was implemented.

Each department developed a three-year course plan that reduced faculty course load and met the parameters established for the project. Once the department plans were approved by a committee of elected faculty working with the dean of faculty, that department moved to a five-course teaching load. Some faculty opposed planning and central oversight of their curriculum; some departments had difficulty thinking in terms of college-wide needs; and some began with unrealistic plans that needed revision; but all succeeded. Now, the plans are updated and reviewed annually. This oversight remains essential to identifying problems, introducing needed change, and validating the process.

The efficiencies achieved support faculty research and have sparked renewed energy across people, programs, and departments.

Using Laddered Teams to Organize Efficient Undergraduate Research

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Three years ago, we joined the Lewis and Clark College psychology department as a husband and wife team, a career-choice heavily influenced by our shared introduction to psychology at Stanford. There we had worked as undergraduates side-by-side with faculty members who had an extraordinary passion for teaching undergraduates and involving them in research. This instilled in us a love of experimental psychology and the aspiration of passing on this enthusiasm to our own students.

Graduate school introduced us to the business of academic life, including the reality of balancing teaching and research. Our training encouraged us to limit time spent on undergraduates. But for us, staying true to our passion meant staying true to our Stanford experience, and this meant spending more time with undergraduates, not less. Taking jobs at a liberal arts college was an attractive first step. Still, with substantial teaching responsibilities and no graduate students, we needed to organize our research carefully in order to immerse undergraduates in the research process and, importantly, make the most of their abilities and efforts. For this, we had to devise an efficient model for faculty-student collaboration.

In our Behavioral Health and Social (BHS) Psychology Lab, we organize research into hierarchical, three person teams. Each team works on a separate project, with a senior or advanced psychology major (team leader) supervising a younger major and a student new to psychology (team associate and assistant, respectively). This model reflects the collaborative nature of experimental psychology, ladders the experiences of undergraduates, and allows projects to progress over an extended period of time. This model has proved quite successful. We liken the capabilities of each team to those of a driven graduate student, and in many ways the capabilities of our teams are superior (i.e., total time commitment, the resource of many minds, and the ability of members to specialize according to their strengths).

At any time, we have as many as 6 active teams investigating various topics in social, clinical, and health psychology. Our students volunteer 8 to 15 hours per week to the lab, including two weekly meetings. Ideally, the assistants advance from novices to accomplished team leaders. As they progress, the students often have as much influence as we do in determining the direction of the lab's research, and in their senior year, team leaders typically supervise a project while completing a thesis that extends their own line of research. As a result, our laddered teams involve undergraduates in a caliber of research usually reserved for graduate students.

Naturally, we have needed to refine this model by addressing a few important details:

The magic number. Two person teams lack a critical mass of energy and abilities, so they quickly lose momentum, and larger teams have difficulty dividing responsibilities effectively. So, as a general practice, we stick to three person teams, which maximize individual involvement and mutual accountability.

Recruiting. We recruit a mix of first-year students, sophomores, and an occasional junior. We look for an interest in graduate school, and we rely on transcripts and interviews. Exceptional first-year students contribute raw talent to their teams, and they are ideal for lab continuity. We select older students only if they are set on attending graduate school; these students make excellent team leaders.

Leaders. Team leaders need to be chosen with great care because they are the lynchpins between the teams and us; the efficiency of the lab depends on their motivation. Only students who clearly want and will benefit from the position are advanced to team leader.

Regrouping. Each year, having graduated our seniors, we face the puzzle of regrouping. To get back to three person teams as quickly as possible, we consolidate teams by re-assigning the assistants (some now as associates) to the most promising continuing projects, and we have a talented junior lead a new team.

The manual. We maintain a comprehensive reference manual and require new lab members to read a primer that outlines basic research methods. We have methods-savvy students extend and update the manual throughout the year and summer.

After just three years, the BHS team model has been featured in our college’s alumni magazine, presented to a group of faculty from nearby colleges, and incorporated into a divisional grant proposal. Teams master complex software and methods on their own and transmit this knowledge throughout the lab; they eagerly contact and collaborate with researchers at other institutions; and seven team presentations have been accepted to major professional conferences. Moreover, four of our team leaders have been admitted to top doctoral programs, including Harvard, with full funding. But perhaps the crowning moment so far has been a friendly lunch at a conference with one of our Stanford mentors, ten of our undergraduates challenging him about his current research. His follow-up email: “Keep up the inspired mentoring.”

Facilitating Creative Activity and Student Involvement
John Bell
Director of Musical Theatre
The University of Central Florida

The playwright's art is a paradox. He writes in solitude words that are to be shaped and shaded by large groups of others: actors, directors, and audiences. When a draft of a play is complete, he attempts to convince a theatre company to produce it. When they do, he listens and then begins the seemingly endless process of rewriting. Once a more developed draft is complete, he attempts to convince another theatre company to produce it. And so it goes.

Because I work in the musical theatre, the model above is changed slightly. Instead of a playwright, a musical is created by a team of creators. The composer creates the music, the lyricist creates the lyrics and a librettist writes the "book" or libretto. The endless cycle of rewriting and striving to secure productions is the same, if not more, difficult because of the complex and expensive nature of a musical.

As Director of Musical Theatre at the University of Central Florida, my administrative and instructional duties often leave me little time to sit at the keyboard (piano or computer) to work on my next new musical, what I hope will be the next Broadway hit.

For many theatre writers, the pressure of opening night has served as the motivation to get the work finished. But when developing a new work, the threat of an opening night may not loom. So, to help motivate and enrich the writing process, I've taken to including my students in the development of the musicals upon which I'm working.

Instead of waiting until a draft is complete, I merely gather musical theatre students for an informal reading or sing-through of a scene or song as it is completed. Once enough material has taken shape, I'll gather the students again for a mini-rehearsal process to result in a table or staged reading. Lots of conversation takes place. Does this scene flow? Is the plot clear? Do the characters have enough dimension? Do you care about what's going on in the scene? Is the song hard to sing? Do the diction of the lyrics match the diction of the dialogue? Etc., etc., etc.

Then I go back and write some more. Recently I invited the Savannah College of Art and Design and their students to come to Orlando for what we've termed a musical theatre exchange. For three weeks prior to the retreat day, each university will rehearse and prepare one half of the musical. Then on the day of the retreat, each school will present their half. Actors from each school are portraying the same characters. So, after the work has been presented, the author(s) have had the opportunity to see and hear two different interpretations of their work and to get feedback from two separate companies of actors.

This model accomplishes a number of important things. First and foremost, the work gets activated. When it is activated, it is contemplated and contemplation typically leads to inspiration. The creative act is invigorated. Second, the students get to participate in the development of a new work. So often, especially in educational theatre, the young theatre artist is only exposed to existing works that have a lengthy history of explored interpretation. Working on any type of original work is exciting because the student gets to be engaged in the creation rather than just the interpretation of a work. And last but not least, the mini rehearsals and reading dates give the piece a number of small opening night deadlines, just enough pressure to propel and motivate the process.

As the cost of mounting a Broadway musical has risen to such prohibitive levels as 10 to 20 million dollars, I have long believed that the care and nurture of new writers could best be achieved in educational theatres because new work is great fun for student actors and authors can have their work heard for a fraction of the cost of a professional production. As a writer myself, I've taken my own advice and it has helped me generate not only the work itself, but also professional development activity such as readings and performances, collaborations with interdisciplinary departments and groups, and attention from professional associations intrigued by the possibilities of this innovative approach.

From this work I dream of a New Works Festival sponsored by a consortium of educational musical theatre programs which meet to present readings of new works with one musical chosen to receive a multi-year commitment for further development in readings, workshops and eventually, full productions. The writers and the work gets a safe environment at minimal costs and the institutions receive the on-going enrichment that original work can provide the educational process. It's a win-win situation, the perfect blending of research and time management issues working in perfect harmony.

Creating time for Undergraduate Research by Facilitating Communications

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Engineering colleges in research-intensive universities are expanding opportunities for undergraduates to conduct research with a faculty member's group. However, effective approaches are needed for assuring that the faculty has sufficient time to conduct research with undergraduates. Undergraduate research projects must fit in with the faculty's unique research obligations and interests, as well as with the students' required program of study and the institution's educational objectives. The College of Engineering and Information Technology at the University of South Carolina has created the Research Communications Studio (RCS) to help meet these multiple constraints. With funding from the National Science Foundation, the college, and three engineering departments, the RCS is a mentored peer and near-peer learning environment in which undergraduate students work on all aspects of planning and communicating their research. By focusing on the communications aspects of research (reporting, speaking, planning, publishing, meeting, etc.) the RCS decreases the burden on the faculty member, while simultaneously increasing the productivity of the student within the research group.

In a typical Research Communications Studio (RCS) group, three or four undergraduate researchers meet weekly under the mentorship of one communications mentor (Ph.D. candidates in English or Linguistics) and one engineering mentor (Ph.D. students from chemical, electrical, or mechanical engineering). A Ph.D. English faculty member monitors and facilitates each studio group. In the studio group, students discuss, write about, and present their research as it progresses. With the aid of experienced graduate students as well as English or linguistics coaches, students learn about every aspect of their research, and are able to contribute more quickly to the faculty member's project. The RCS facilitates the process of learning to do research by a process called "distributed cognition"; that is, the collective knowledge of the group participants is available to the individual learner. Weekly meetings insure that students enter the lab prepared to do their work, thus reducing the time spent by the advisor on bringing the student up to speed.

Both faculty and students have enthusiastically embraced the RCS approach to mentoring undergraduate research. One of our participating faculty members wrote:

I believe this produces the most well-defined result that I've ever seen from an undergrad project. The help with guiding the students' writing process was tremendously beneficial to the research outcomes. I did not have time to achieve these results by working alone with the students. The RCS really leveraged my time.

Other faculty have commented on the very evident maturing of the undergraduate's thought processes and improved organizational and writing skills. Students themselves, speaking through anonymous surveys as well as weekly written reflections, have noted many areas in which improvement in communications skills has saved them time. For instance, the seemingly simple process of contacting a vendor about repairing a piece of equipment can be a complicated and inefficient process without proper understanding of the vendor as an "audience" for the phone or email exchange.

It is important that this undergraduate research initiative be compatible with the undergraduate curriculum, as well as the culture of research in which faculty function professionally. The RCS is linked to pre-existing Independent Study courses, taken for one credit hour per semester for three semesters. At present, three engineering departments (Chemical, Mechanical and Electrical) are working with the RCS. The RCS schedules meeting times so that students meet weekly for 75 minutes. RCS staff members facilitate communications between students and research advisors. For example, each semester the RCS staff requires students to write up their research objectives for the semester and to prepare a task plan. This is done in conjunction with the research advisor. The RCS staff also helps the students and advisors plan and prepare papers, presentations, and posters for national meetings. The faculty research advisors are not burdened with any extra responsibilities or duties.

The RCS, while still developing, has been a resounding success so far with both faculty and students. The number of student papers, poster presentations, and competitions entered and won has increased in a little less than two years of operation. The RCS is a promising formal model of nurturing undergraduate research programs while simultaneously increasing faculty productivity.

Creating Time for Research by Structuring the Educational Experience of Laboratory Orientation, Skill Building, and Peer Mentoring.

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One way that I have found that produces more time, over the long run, is by formalizing new student orientation to the laboratory, systematizing laboratory skills development, and creating a hierarchy of peer mentors that ultimately reduces the need for me to teach each student everything they need to know.

As they affiliate with my laboratory, each student meets with me and / or our laboratory coordinator and receives basic information about operations of the lab. As part of their initial orientation students are shown where supplies and equipment are stored, trained in animal handling, care and use, and are instructed how to make entries in the lab books. During this orientation, the student is given a *Lab Associate's Checklist and Handbook*. The Handbook contains a list of expectations, sheets used to keep track of time in the lab (sign-in; sign-out), information about achieving Senior Associate status (see below), information about how paper authorship decisions are made and an extensive checklist that students may use to keep a record of their training and performance of key lab tasks. They, and the person doing the training, sign a statement as verification of the training. Within a day or two the student must pass a written quiz on the material covered during the orientation.

Of course, orientation to the laboratory continues over several months. One of the ways we have facilitated this extended training is through the use of peer trainers or "Lab Buddies" - as we call them. Lab Buddies are seasoned lab associates who are assigned to the new students based on their class schedule (so that there is a good chance they will be working in the lab at the same times) and their expertise. Lab Buddies work with the new student for at least a semester and sometimes longer.

Senior Associates are student peer experts that, in many ways, form the core of the training and quality control functions of my laboratory. Since they take on important training responsibilities, they are also instrumental in saving faculty time. A student becomes a Senior Associate after s/he has taken specified coursework, become expert in the work performed in the lab, performed and documented an independent Senior Associate" Focus" Project, and passed an oral quiz about the ongoing work of the lab. Senior Associates work with the faculty member and the laboratory coordinator to do planning and make the major decisions for the lab (e.g., What will be our next experiment? What will be the topic of the next grant proposal? Who will be working in the lab this summer?). Senior Associates are the peers that less-experienced students consult with to get information and advice. As such, the Senior Associates are a critical part of the lab management team.

Once selected, Senior Associates manage much of the training in the laboratory. All students receive a *Lab Associate's Checklist and Handbook* when they begin their work in the lab (see above). One component of the Handbook is a list of skills and techniques that a student may acquire. Students first observe the particular task they wish to learn. Once they have watched this skill for the first time, they have the faculty member, the lab coordinator or a Senior Associate verify this by signing on the 'observation' line of the checklist. Additional training is available and each aspect of the training is documented. When the student feels comfortable with his/her skill level in that area, they schedule a time with one of the lab managers to be tested on their proficiency in the task. We insist that the training-test interval be at least one week to ensure that the student can retain the skill over time. Again, a written record of the test result is made. Once this process of observation, training and successful testing is complete, the student is qualified to perform this particular task on their own. We have found that this method of initial observation, training and testing has been instrumental in maintaining quality control in the laboratory.

When you teach, you learn. The use of peer mentors is not only aimed at creating more time for faculty research, it is a powerful mentoring tool for the Senior Associates themselves. As they teach junior peers, they are continuing to enhance their own laboratory and interpersonal skills.

For more information on this model, see:

Mickley, G.A., Kenmuir, C.L. and Remmers-Roeber, D. 2003. Mentoring undergraduate students in neuroscience research outside of the classroom setting: A model system at Baldwin-Wallace College. *Journal of Undergraduate Neuroscience Education*., 1(2), A28-A35. Available online: http://www.funjournal.org/issues2.asp?volume=1&issue=2

Research and Teamwork in a New College of Engineering
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The College of Engineering at Rowan University (RU-CoE), Glassboro, NJ, graduated its first class in May 2000. One of the newest in the U.S., it was made possible by a $100 million pledge from Henry and Betty Rowan. RU-CoE has 32 faculty split evenly between Chemical (ChE), Civil and Environmental (CEE), Electrical and Computer (ECE), and Mechanical (ME). It is primarily undergraduate in nature; however, MS degrees are also granted. Engineering Clinics are a major factor encouraging undergraduate research at RU-CoE.

The Engineering College at Rowan is committed to innovative methods of learning to best prepare students for a rapidly changing and highly competitive marketplace. Key objectives include:

- multidisciplinary experiences through laboratories and coursework;
- state-of-the-art technologies;
- continuous opportunities for technical writing and communication, and
- hands-on, open-ended problem solving, including undergraduate research.

One way RU-CoE meets these objectives is with common Engineering Clinic classes (Clinics). All RU-CoE students enroll in Clinics in each of their eight semesters at Rowan. Each Clinic involves teamwork (often interdisciplinary), hands-on activities, and report writing and presentation.

Freshman Clinic is focused on an introduction to engineering and engineering measurements (Fall) and competitive assessment (Spring). Sophomore Clinic is focused on engineering design (Fall and Spring) and is team-taught with communications faculty. Where possible, in the communications portion of the course, students write about and give speeches related to their engineering work. Freshman and Sophomore Clinics introduce students to hands-on problem solving, working in multidisciplinary teams, and reports and presentations, preparing them for Junior and Senior (Jr/Sr) Clinics.

In Jr/Sr Clinics students work in teams of three or four on open-ended projects under the supervision of one or more professor. Many focus on research, others on design or assessment. Juniors and Seniors often work together. Projects can last multiple semesters and are usually funded by industry or governmental agencies, with support ranging from zero (i.e., pro bono) to $1 M. Over 60 projects run in a typical semester at RU-CoE.

I am a faculty member in CEE. CEE projects have ranged from a million dollar contract to model the Betsy Ross Bridge to a pro bono project with Engineers Without Borders. Since 1998, I have worked with 30 teams of students (54 different individuals) on multiple projects funded by nine different sponsors, including consulting firms, NSF, EPA, and the Air Force Center for Environmental Excellence (AFCEE). AFCEE has funded the development of new site assessment and remediation technologies, with demonstrations at four Air Force Bases (total funding = $670,000). Nineteen undergraduates--in 11 clinic teams--and two master's students have worked on AFCEE projects. Students have spent two weeks in the field at Westover AFB, Altus AFB, Elmendorf AFB, and Dover AFB, in Massachusetts, Oklahoma, Alaska, and Delaware, respectively. They have analyzed over a thousand sediment and water samples. The current project is a first time field application of Biogeochemical Reductive Dechlorination (BiRD) at Dover AFB. The BiRD technology stimulates bacteria to create FeS *in-situ*. FeS is a mineral that reacts with certain chlorinated solvents, including Trichloroethene, destroying them by reductive dechlorination. So far, undergraduates have conducted the baseline assessment and injected over 50,000 liters of sodium lactate and magnesium sulfate (to generate FeS). They are currently monitoring post-injection results.

Teams of CEE, ChE, and ME undergrads have obtained real world experience in site characterization and remediation, chemical analysis, data manipulation, and presentation. During the semester, undergraduates work on the projects as part of their Junior or Senior Clinic. Some students have also worked on projects during summer periods. The work has resulted in journal publications (one in press, one in submission, and two in progress) and ten conference publications. Undergraduates have presented at an additional nine conferences.

Junior and Senior Clinics are two-credit courses; thus each student completes 8 credits of upper level clinic. Faculty members at Rowan University have a 12-hour workload, equivalent to teaching four 3-credit hour courses. RU-CoE faculty members teach two "traditional" courses a semester (which may include freshman or sophomore clinic) and two Jr/Sr Clinics, summing to 9 hours of workload. Another 3 hours of workload is devoted to scholarship; thus, professors can devote up to half their workload to activities involving undergraduate research.

The success of undergraduate research in RU-CoE has a number of factors. A supply of students is assured by the 8 credit hours of upper level clinic. Faculty can commit up to half their workload to activities involving undergraduate research. Involvement in undergraduate research is valued in the tenure and promotion process. Faculty members are committed to staying current in their fields; working with Clinic teams on real-work projects provides is an excellent way to keep current. All of these factors have contributed to the success of undergraduate research, and the Engineering Clinic program, at Rowan University's College of Engineering.

Making Time for Research

William Dinklage,
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Utah Valley State College

Utah Valley State College is an open-enrollment institution that still does not have four-year programs in many of its departments (it was a community college only 11 years ago). Its focus is teaching, and the teaching load is high: five courses per semester (15 credit hours) is the supposed institutional load. For accreditation the physical sciences had to reduce the teaching load to four courses per semester (12 credit hours), but biology is still stuck with the full five-course load. Adjuncts teach the lower division labs, but we teach our own upper division labs, which can add an additional two or three hours a week each semester on top of the classroom teaching load.

Despite the teaching emphasis, the School of Science and Health is making efforts to increase the opportunities for undergraduate research. A new tenure document is in the works that will require engagement in some kind of significant professional activity beyond teaching, and an interest in undergraduate research is looked upon favorably in new faculty hiring. The College and the School of Science and Health have encouraged undergraduate research with in-house funding of projects at levels in the range of $1000-$5000 and by providing competitive stipends for summer research. The school is also able to buy release time to give faculty time to do research.

This semester I have been granted reassigned time equivalent to one course to work on an NSF proposal to support undergraduate research. My teaching load, therefore, is three classes, and none has a lab. I requested them to occur all on Tuesday and Thursday so that Mondays Wednesdays and Fridays I can set aside for grant writing and research that I started last summer. Of course, as Tuesdays and Thursdays are such heavy teaching days, I spend a fair amount of time on the other days meeting with students, processing grades, etc., but it is extremely helpful to be able to set aside research time in day-long blocks when I can. My reassigned time came from the School of Science and Health, which has a dean with strong record of peer-reviewed publication in biology and who has been very supportive of faculty research.

The dean of the School of Science and Health will buy reassigned time for major grant proposals and major research activity (such as that which would result in a paper). According to him, out of 52 full-time faculty members in the School, “several” receive reassigned time for proposal writing alone each semester. This comes out of a pot of $125,000 that the dean has set aside for research. As he put it, when he became dean he “scoured all accounts in the School” to find this money. This account also supports stipends for faculty summer research (three available, at about $7000 each), research expenses for faculty, research equipment, and small proposals by students. Our dean continues searching for donors to augment this account. If any of us in the School of Science and Health are awarded an external grant that can pay for salary, we can buy reassigned time with that as well.

Making Time for Research through Integration
John Chapin
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It's that time of year again: The dreaded Faculty Activity Report (FAR). Because tenure track assistant professors are among the most organized of all beings, and because we have saved every acceptance letter, grant report, committee note, and email that could possibly "count" as something, filing an impressive FAR is not the problem. The problem is figuring out what's what? Was that project more research or service?

I make time for research by integrating teaching, research and service as much as possible. Think of it as the proverbial killing two birds with one stone (only there are more stones and I'm not sure who the birds are supposed to represent). Here's how it works.

My research area is health communication. I specialize in public communication campaigns. I teach undergraduate communications courses. My current project is youth violence prevention education. During the summer, I work with youth counselors at a local women's center (community service) to review student evaluations (research) and refine the communication campaign (service), a weeklong school-based intervention including violence awareness, prevention, and accessing community resources. A combination of expert guidance, peer support and video testimonials is used. During the fall semester, I offer an independent studies course (teaching) in public communication campaigns to ready students to participate in the project. Students contribute to the literature review and enter the data as it is received from the women's center (student research). Internal and external grants fund students as research assistants (another "stone" for the FAR). During the spring semester, students present their findings at the university's undergraduate research fair and submit papers for the state communication conference (student research). I begin writing papers for regional and national conferences (research presentations). I have also done follow-up sessions for parents, teachers and administrators (service, recruiting). These sessions generate press coverage (more publicity). During the summer, manuscripts are sent for publication (research) and reports are completed for the women's center (service). By mid summer, the process begins again.

The benefits of community partnerships are obvious. The school system gets free quality violence prevention, which is continuously improved and adapted for their students. The university maintains strong ties with the schools and community members and generates positive public relations. The faculty member gets rich data from the field for research and teaching purposes. The community center gets academic expertise they couldn’t otherwise afford. External evaluations insure the quality needed to generate the interest of outside funders needed to pay for the program. This brings it back full circle to free quality violence prevention education.

Integrating my research with service and teaching in this way keeps me organized and sane. It seems to “create time” for research, because I never feel torn from one task to tend to another. I don’t need a designated “research day” or “service day,” so my workload is one continuous uninterrupted stream. … If only the university would take a similar approach to the FAR.

Grass Roots Movement and Cooperative Spirit Enable Teaching Load Reduction at Westminster College

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Teaching Load Reduction Begins 2004-2005

The teaching load at Westminster College has increased significantly since the1980's. The existing load, 28 semester hours, allowed almost no time for research; yet there was no halt to the ever-increasing expectations of faculty scholarship. The workload had become unbearable, requiring a change to ensure the professional vitality of the faculty. Inspired by the grass roots movement of dedicated faculty, and brought to fruition through faculty-administration cooperation, a campus-wide reduction in teaching load is becoming a reality at Westminster College.

Fall Workshop Inspires Grass Roots Movement

The Fall 2001 faculty workshop utilized small group discussion to focus on its topic of faculty development. The top response of each group included a strong statement requesting from the administration a reduction in faculty workload. At a faculty meeting the next morning a motion was made to create an ad hoc committee to investigate the viability of the 24-hour teaching load. The stated rationale was that while reduction in teaching load is often discussed, and seems important to faculty development, little information on its viability is available. The motion passed unopposed.
An ad hoc committee was elected and worked throughout that year, gathering information, meeting with department chairs, registrar, associate dean, dean and the president. At a faculty meeting in April, 2002, the committee presented the results of its work and a motion to adopt a 26 hour teaching load for four years beginning in 2003 (implementation was delayed by one year because of a sudden departure of our academic dean), to transition to a 24 hour teaching load beginning with the academic year 2007-2008, and to elect an ad hoc committee to oversee this transition. The motion passed.

Roadblocks Overcome

Administration initially expressed reservations about a possible reduction in teaching load. Considering the bleak economic outlook in 2001, hiring an additional 18 faculty members was simply impossible. Concern was also expressed about possible negative effects on students, i.e., increased class size, reduced quality in academic programs, and limited student choice. Compelling evidence from the ad hoc committee, strong faculty support, and the advocacy of our new Vice President of Academic Affairs (VPAA) convinced administration of the necessity of the teaching load reduction. As a testament to administrative support, the teaching load reduction is explicitly stated in the 5-year Strategic Plan (2003-2007) of the College, a plan that is approved by the Board of Trustees.

The ad hoc committee worked with the president, the VPAA, the registrar, and department chairs to find ways to reduce the number of classes taught without reducing the quality of the education that Westminster students receive. Creative approaches include: offering some courses on an alternate year basis, slightly increasing class size (especially for courses with multiple sections), careful scheduling of electives in the major to avoid low enrollments. This past fall departments designed a 4-semester teaching sequence that incorporates the reduced teaching load of 26 hours per year without hiring additional faculty.

As President R. Thomas Williamson affirmed in the College Vision Statement, “With great care, mutual respect and cooperative spirit, we shall take a step toward our objective of world-class teaching and mentoring by moving in the fall of 2004 to a 7/6 (alternating year; average of 26 semester hours) course load for our faculty…Depending on our success, we shall move to a sustainable six-course (24 semester hour) load in the fall of 2008.” It is only with the “cooperative spirit” between the faculty and administration that this teaching load reduction is possible.

Research Time Increases

The grass roots movement of the faculty at Westminster College established the necessity and viability of a reduction in teaching load. The cooperative spirit of Westminster’s faculty allowed the possibility of change. Working together, the faculty and administration have crafted a plan to phase in this reduction over the next four years, creating additional time for research.

A Time to Do Research, A Time to Teach

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As an assistant professor at a regional, comprehensive university, I certainly feel that the days are too short to meet all of the expectations of my job. Many students, parents and senior faculty expect me to spend most of my day teaching or performing administrative work. My college dean and university provost expect me to publish and obtain grants. Often the two demands seem conflicted and either I spend time being a good teacher or a good researcher. However, to do research and teaching at my institution, I cannot treat them as mutually exclusive activities.

So how do I justify doing research if teaching is my primary responsibility? Engaging in research helps me improve my teaching. By doing research I am forced to learn new material and keep up with the literature. I experience firsthand what I ask my students to do when I guide them to learn. Doing research also makes me feel the excitement of discovery, and it keeps me focused on what science is all about.

How do I find time to do research? I found time to do research by overlapping my teaching and research efforts so that the time I spent preparing lessons could be used to prepare for research. Because personalized, independent study courses are considered as overload at my institution, I had to figure out how my research could be integrated into courses within my usual load. To be true to each activity, I decided that certain criteria must be met. For my research efforts, the questions asked and data collected need to be worthy of publication and funding. For my courses, the needs of the students are paramount. They need to learn skills and knowledge that will be useful for their future. Blending the teaching and research activities in light of these requirements is the most difficult hurdle I have to overcome and requires my most creative effort.

I am a molecular biologist, and I teach an upper-division molecular laboratory course and a lower-division genetics course. I chose the molecular laboratory course to blend my teaching and research activities. I spend the first half of the course teaching standard molecular methods. During the second half of the course, I show students how these methods are used in a project. The classroom project relates to my research. The challenge in designing this course was to figure out how to define the project so that naïve students could achieve meaningful results within a short period of time. For me it was necessary to shift my research focus to a question that was more amenable to these conditions.

It soon became apparent that several curricular changes were required to make my project-based course a success. The first major change was to add a laboratory component to the genetics course, which serves as a prerequisite course for the molecular laboratory course. This change was made possible through funding from the National Science Foundation's CCLI program. In the genetics laboratory, I started to teach beginning students the gist of experimental design, how to use common laboratory equipment, and how to record and interpret data. Students who continue with the molecular laboratory course can build on experimental methods they learned in the genetics course. By attempting to make research possible, I also improved my teaching by involving students early on in thinking about how science is conducted.

The second curricular change that occurred involved the instructor of the first biology major's course. After conversations with each other, we both decided to move toward implementing active learning exercises in our teaching. Active learning helps students learn independent thinking, a necessary component of research. Part of convincing the freshman biology instructor to alter his course was to engage him in a collaborative research project that students in my molecular laboratory course carry out. His traditional background and my molecular laboratory skills make this collaborative research possible. His modification of the freshman course yielded quick results. Students in the freshman biology and genetics courses are not so bewildered by the idea that they are partners with us to learn new things.

We are able to do research in the face of heavy teaching loads because we have incorporated aspects of our research into our teaching. Doing so created a group of skilled students who have participated in our research effort. I am lucky to have a colleague I interact with daily so the effort of research does not seem overly burdensome. I had to adjust my research interests to match the interests of my colleague, the needs of my students, and the resources of my institution. For us, the time to do research is incorporated into the time we teach.

Double-Dipping as a Means of Creating Research Time
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Finding adequate time to spend with students in research has always been difficult. But, in the fall of 2002, the three Natural Sciences departments at Northern Kentucky University moved into a new, state-of-the-art $38 million Science Center and this move affected demands on research faculty in an unexpected way. The building was designed to promote integration across all the natural science disciplines and to foster student interest in science. After moving into this wonderful new space, we discovered the enviable problem that student interest in science and science research grew dramatically. That growth placed even greater demands on faculty to be creative in their search for time with their research students.

Fortunately, for my personal research, the building design itself allowed me to develop a time solution that had not been available in our older building. Our department (Chemistry) chose a design in which every two matching labs (teaching or research) were constructed with a shared instrument or computer lab. At the time of the design, because there was only one biochemist (myself) in the Chemistry Department and one molecular biologist in the Biology department, a single shared teaching lab was designed for the two lab courses. Because there was no matching teaching lab, it was paired not with another teaching lab, but with a biochemistry research lab that our department offered to allow the molecular biologist and I to share. In this way, equipment used for biochemistry/molecular biology research could be shared with the teaching labs. So the solution to the time dilemma became not so much one of creating more time for research, but in "double-dipping" for time with the double space we had created.

The double dipping was made possible by the following set-up. In the fall semester, I taught a 2 credit hour biochemistry lab, which ran every Tuesday, and Thursday morning from 8 to 11 AM. In addition, two of my research students and I were able to schedule our time together also on Tuesday and Thursday mornings (and into the afternoon.) So, after a given "black out" time for me to give pre-lab lectures to my biochemistry lab students, my research students had free rein to come into the adjacent teaching lab to seek my help with equipment and protocols or in on-line literature searching from the teaching lab's smart classroom computer. In this way, I was able to mentor more research students than I had done in the past because I didn't have to find additional time during the week for each of the students. I could give my biochemistry lab students and my research students quality time at the same time.

This research time plan has led to additional unexpected benefits. One benefit is that this plan has become part of my normal routine even when I am not teaching biochemistry lab in the room next to my research lab. For example, in the spring semester, I taught two freshman general chemistry labs, again on Tuesday and Thursday mornings. Even though the general chemistry labs are on a different floor than my research lab, I still invited my research students to use the shared computer lab or spare bench space in the freshman lab whenever equipment needs didn't require them to be physically in our normal research space. Again, they always had to remain outside during the blackout period of pre-lab lectures or quizzes so as not to interrupt the teaching environment for the lab students.

A second benefit of the double-dipping approach was that the lab students, both freshman general chemistry and senior biochemistry, became very interested in the research students and their projects. They inquired about how they themselves could become involved in research or how to become a chemistry major and what a chemistry major could do with their degree. They talked to my research students and asked them to explain their projects. So my desperation time-management "experiment" had achieved a much broader impact than I could have ever hoped or anticipated.

So, fast-forward to the academic year 2003-2004. I am no longer using the double-dipping method of teaching labs while conducting research with undergraduate students because I am no longer teaching lab courses. I assumed the role of Chair of the Department of Chemistry beginning in July, 2003. As one can imagine, it is much more difficult to double dip my time between the chair's office and the biochemistry research lab. However, the lessons I learned from my one year in this building have informed my ideas as chair. I hope to develop a plan that invites and supports my research-active faculty to do the same with their lab teaching time. In our current setting and perhaps in others, the solution to creating more time for research can be not to create the time, but to creatively use time that originally seemed unusable for research.

Creating Time for Research; Undergraduate Students as Research Partners
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When I accepted my first academic appointment at a small, teaching-oriented liberal arts college, I wondered how I would have time for my research. I tried setting aside a block of time every week for research. I quickly learned that research productivity required more than a block of time since students and colleagues often infringed upon this block. Since then, I have tried to make research time by involving students as research partners. Faculty short-change students if we do not provide research opportunities for them and if we do not use research as part of our teaching. While I incorporate a research component in all of my courses, including my introductory course, this vignette focuses on how I have used my research methods course to further my research program.

I tell my students they cannot learn methods simply by reading about them, nor can I teach research methods without having used them. Therefore, I make my research methods course a hands-on research course. Students conduct original research from conceptualizing the problem to writing the research report. Furthermore, I often piggyback my scholarly interests onto class projects giving me a way to research while teaching twelve hours a semester and serving as department chair. I want to discuss three examples from this course.

Early in my career, an official of the local school district approached me about investigating the performance of children who had moved into the school district. This opportunity excited me, since I wrote my dissertation on migration. Yet, I knew that I did not have enough time to conduct the study by myself. I asked the school official to present this study to my methods class as a potential class project. Students responded enthusiastically. They valued conducting research that could make a difference in their community (what we now might call service learning). Students designed a questionnaire. They then devoted considerable time (in hindsight too much time) to conducting face-to-face interviews with parents of children in local schools. They also collected information on academic performance from students' permanent records, giving real world meaning to the need for confidentiality in social research. Each student completed analysis, testing specific hypotheses of interest to him or her. I worked with the students to draft a report to the school board documenting that children moving into the district performed better academically and had fewer disciplinary problems than those already there. The course's teaching assistant, a senior major, and I also wrote a more general paper on our findings that we presented at a professional meeting and later had published.

My second example involved not only creating research time, but also creating time for community service. The local family planning and health center asked me to serve on its Board of Directors because of my demographic interests. The directors wanted to know what services the agency could provide for college students. We turned to my methods students offering them an opportunity to learn while doing. We reported to the Board that students supported family planning activities in general, but had little awareness of the local agency and its services. I also used these data for conference presentations and for class presentations.

My final example shows that research methods students sometimes stimulate ideas for personal research. Several students had an interest in studying rape myths. After talking with them and with other colleagues, I became interested in this topic. I added my own questions to the class questionnaire to investigate how religion influenced attitudes about rape myths. I published a paper reporting results from a study I never would have undertaken without my students' interest in the topic, and never would have completed without their aid in data collecting.

Not everyone teaches a research methods course nor can have students collect original data. Student projects in almost any course, however, can facilitate faculty research. Furthermore, having students begin conducting simple research in the introductory course prepares them for more advanced research in upper division courses. For example, I have a series of papers on migration and southern religion that grew out of a student's project in my Sociology of the South course. I encouraged a particularly good student, who had been in my introductory course, to investigate a topic in which I had an interest. We then worked together after she had finished the course, jointly presenting papers on the topic.

Students can become excited about research. We can stimulate this excitement, but so too, their excitement can further our interest and increase our productivity.

Creating More Time for Research Through Institutional Change
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The College of New Jersey (TCNJ) is recognized nationally as a highly selective public college focusing on undergraduate education, with a comprehensive range of programs including liberal arts and sciences as well as professional schools. The college, founded as a normal school, has evolved over the years into a selective college emphasizing academic rigor, intellectual inquisitiveness, and social consciousness. This identity change led to embracing the teacher-scholar model in which teacher and scholar roles intertwine and are mutually enhancing. In 2000 the college launched a comprehensive and progressive program of transformative change to achieve a definition of faculty and student work that actualizes rigorous pedagogical principles while working within state-mandated parameters.

Curricular Content and Structure. To launch the transformative change process, the campus community made a fresh commitment to active, engaged, and deep learning (see http://academic.intrasun.tcnj.edu/work/guidingprinciples.doc). These guiding principles have served as the launching pad for faculty and student work reform as well as comprehensive curricular redesign. New programs have fewer courses with each course focusing on deeper learning and including hands-on pedagogies. A concrete reflection of these pedagogical principles is a new list of course types, transcending the emphasis on lecture courses to embrace such categories as “Discipline-specific Research Course” (building on the Research Course model developed and implemented in the mid-1990s, see Baenninger, 1999) and two levels of “Independent Research.”

Moreover, some scientific departments have constructed developmental learning sequences, supporting scientific and empirical reasoning skills through rigorous classroom instruction and undergraduate research opportunities. For example, psychology majors start with three successive courses that build methodological and scientific reasoning skills (a key learning objective in the major). Students then select from a variety of research-focused seminars and experiential learning options including Individual Research (one-on-one student-faculty research), Research Roundtable (individual or small-group projects within a defined area with faculty and research-team guidance), Laboratory Learning (faculty-directed ongoing scholarly research program run collaboratively with a team of student research assistants), and a yearlong Honors Thesis research project.

Faculty and Student Work. A critical factor in the transformation is redefining faculty and student work to optimize the above-mentioned pedagogical principles and curricular innovations. The state-defined faculty "workload" is 24 "faculty weighted hours" (FWH) – a teaching-based currency. Faculty reappointment and promotion are based on documented excellence in the areas of teaching, scholarship, and service. The mismatch between these definitions of faculty work, as well as growing faculty dissatisfaction with campus scholarship support and challenges in attracting talented new teacher-scholars, triggered a comprehensive reexamination and redefinition of faculty work. Working within the state-stipulated currency of 24 FWH, we have reassigned faculty time to three categories: (1) 18 FWH of classroom teaching (3 FWH per course), (2) 3 FWH to support curriculum development and innovation, and (3) 3 FWH to support scholarship. In addition, faculty may apply to the college-wide Support of Scholarly Activity committee to receive supplemental assigned time (3 FWH annually) for scholarship. Approximately one-third of the faculty receives these supplemental awards (annual or three-year) to support more intensive scholarly endeavors (often including undergraduate research opportunities). Faculty can devote further time to scholarship if externally supported through grants and contracts from public and private sources.

Another key workload issue in the development of a research-intensive curriculum is reflecting the value of undergraduate research in faculty work. To date, mentoring undergraduate research has been outside of a heavy teaching load. Faculty overload compensation for independent research has been negligible—certainly out of proportion with the time involved in quality mentoring. A new articulation of faculty workload and course weighting revalues significant independent research experiences at 0.5 FWH per student, for up to 3 FWH per academic year.

Ongoing Challenges. Embracing the teacher-scholar model and the value of faculty and student scholarship as integral to TCNJ's mission has budgetary implications. Increasing faculty and student scholarship requires additional financial investment in such areas as laboratory maintenance and research expenses, student and faculty travel, and technology infrastructure and support.

Also challenging is the cross-generational dissonance when scholarship is defined anew as part of the faculty role. What does having 3 FWH assigned time for scholarship in load for all faculty mean for faculty who do not have a scholarship program? What faculty development needs are triggered by this dissonance?

Finally, if 3 FWH assigned time for scholarship is now a defined part of all faculty members' workload, how do we show it? We have a particular obligation (and political urgency) as a state institution to demonstrate such "accountability" but this term raises the hackles of faculty for whom academic freedom is a precious right.

References

Baenninger, M. A. (1999). Undergraduate research as a curricular element: Multidisciplinary courses at The College of New Jersey. *Council on Undergraduate Research Quarterly*, *XX*(1), 8 – 13.

Making More Time for Research at UMM – a Curriculum-based Approach

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At the University of Minnesota, Morris (UMM), the chemistry discipline (six full-time faculty) has adopted a curriculum-based approach to finding more time for our undergraduate research efforts. UMM is a solely undergraduate, selective public liberal arts college of 1,900 students that graduates 15-20 chemistry majors per year. Given the lack of graduate assistants or course release time for research, a good way to find time for undergraduate research is to build it into our required curriculum. Hence all chemistry majors are required to take a two-credit "Introduction to Research" (ItR) lab course, ideally in the second semester of their sophomore year. This course replaces the traditional second semester of organic lab.

The ItR lab meets for two 3-hour lab periods per week. On the first day, the chemistry faculty members present their research interests and the students are asked to choose the projects on which they would be most interested in working. The students are then grouped based on their project preferences. In the first five weeks of the semester, the students are immersed in learning the tools necessary for carrying out their research: searching the chemical literature, writing a research proposal, keeping a good laboratory notebook and learning advanced techniques and analysis (FT-NMR, GC-MS, molecular mechanics calculations, etc.). The last ten weeks of the semester are spent carrying out their research under the guidance of the ItR instructors and their research mentor. The course culminates with a poster session and the submission of a formal written research report following the guidelines recommended by the American Chemical Society (ACS) Committee on Professional Training.

The course developed from successful "research-like" experiences in our traditional general chemistry and organic chemistry labs. Honors general chemistry students had the opportunity to work on a "do it yourself" (DIY) project, and the third-quarter organic lab students developed their own "Pet Molecule" project. The DIY and Pet Molecule projects were similar in that the students had to come up with an idea to explore and then develop a strategy for answering the question(s) involved. It was clear that these projects offered the students a taste of the ultimate learning experience that research provides. Thus it was a logical extension, when the college was mandated to switch to semesters in 1999, to propose the new ItR course with a real research experience built in. An NSF-CCLI grant (DUE-9950715) was awarded to help incorporate this curricular revision, and the move to a new building in 2000 provided necessary improved facilities. The first offering of the ItR course was in spring 2000.

The ItR course has been highly successful, but not without hitting some roadblocks. As with undergraduate research, faculty involvement in the ItR course is burdensome. A requirement for success is the full endorsement and cooperation of all of the chemistry faculty so that the students can be distributed evenly among all faculty. Workload credit is also an issue. Only the two faculty members directly involved in supervising the lab sessions are credited with teaching the course. The remaining faculty members spend many hours per week supervising their ItR students on their research projects, but this is not credited toward their teaching workload. Fortunately, UMM is a highly collegial campus with an administration whose official approach has not impeded the endorsement of and involvement in the course by the chemistry faculty. Another issue has been assigning the groups, which can sometimes be difficult on the basis of the student's top choice of project. Some research projects are more attractive than others and it can be difficult to evenly distribute the groups and make sure that the student is working on a project s/he is very interested in. Another minor roadblock has been that some sophomore chemistry majors find the workload associated with this course to be too great, and wait until their junior or senior year to fulfill the requirement. Given that the ItR course can direct students into continued research efforts (see below), delaying participation in the course means that these students are less likely to participate in long-term undergraduate research projects with UMM faculty.

Although the course requires much effort from both students and faculty, both reap great benefits from participation. Perhaps the greatest benefit of the ItR course has been that it has created a "pipeline" for student involvement in research and lowered the "learning curve" for students wanting to further their undergraduate research careers. It is not uncommon for the students in the ItR course to continue their ItR research in their junior and senior years with the same faculty member. Their ItR experience maximizes the probability for future success, as the students already have the tools and skills to make significantly greater progress on their research than they would have otherwise.

Time for Research in a Teaching-Intensive Environment: A Course Design

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Ten years ago, time for research was not an issue for biology faculty at Sacred Heart University (SHU). There was no standardized course reduction for research-active faculty, no dedicated space for research activity, and no precedent for external funding of faculty research projects. With a 12 credit (15 contact hour) teaching load, even those biology faculty with interest in potentially low budget field projects found it very difficult to maintain research effort during the academic year. Publishable research activity was simply not an expectation of faculty in the natural sciences. This expectation changed dramatically in the early 1990s, however, with the recognition that student research experience needed to be incorporated into the undergraduate curriculum. Biology faculty members hired thereafter were expected to design research projects specifically for undergraduate participation. I was the first such new hire in 1993, and was followed on almost a yearly basis by additional new tenure-track faculty as our student body grew.

Senior members of the department were instrumental in bringing about this culture change by vigorously advocating for both the space and time resource needs of their junior colleagues. On the department level, research time was carved out by a combination of clever scheduling and curriculum development. Our most creative strategy for providing research time was the design of a new upper division course for biology majors, titled 'Supervised Research' (BI390). BI390 departs significantly from the traditional research methods course sometimes required of science majors, and the distinctions impart substantial benefits not only for the enrolled students, but also for the instructor. Traditional research methods courses may enroll a dozen or more students, each ultimately working on distinct research projects. Teaching responsibility for these courses often rotates among members of the faculty from year to year. By contrast, BI390 is enrolled by two or three students per section, and all research-active members of the department offer a section of the course every semester. The course is not a major requirement, but does serve as a major elective. Students enrolled in the course are required to participate in faculty-directed research for 10-12 hours per week and to present the results of that research in poster or seminar format. The questions investigated by the students are based on the instructor's own research objectives. The students are not bottle-washing assistants, however. They must take ownership for some component of the broader investigation by mastering one or more techniques and independently obtaining data relevant to a specific experimental hypothesis. Most students enroll in the course for a minimum of two semesters, so that they have adequate time to accomplish these objectives. As instructor, the faculty member receives 2 credit hours per semester so long as their course section is enrolled by a minimum of two students.

Compared to the traditional research methods course, the high relative cost of BI390 on a per student basis is apparent. Nevertheless, the substantial positive impact this course has had for both students and faculty is a compelling argument with our cost-conscious administrators. For students, the one-on-one research mentoring and depth of engagement is a transforming experience.   For the instructors, BI 390 is time spent teaching. But that teaching is so tightly integrated with their research interests that a substantial weekly block of time results during which he/she is actively thinking about research pursuits. And slowly but surely, if organized with care, undergraduate research teams can generate enough data to contribute to the forward momentum of their mentor’s research project.

Our strategy for creating research time would undoubtedly be difficult to implement in a larger department. As our department has grown (from four to eight full-time faculty since 1992), and particularly as new faculty have replaced retiring faculty that were not conducting research, the cumulative impact of the supervised research course sections on regular course staffing has been substantial. Our discipline-specific policies governing faculty-student research are also having a broader influence as undergraduate research is being institutionalized at SHU. The benefits of undergraduate research have become apparent at the highest administrative levels, resulting in initiatives to support such endeavors across disciplines. As major programs in the social sciences, health sciences and humanities begin developing their own faculty-student research models, the issue of creating equitable time for research across disparate fields of inquiry will need to be addressed.

In summary, there is more to ‘time for research’ than the absolute amount of time available. There are clear advantages to having large blocks of time in which one’s only focus is research (e.g. summer or sabbatical). There are equally important advantages to maintaining momentum even if with only a few hours a week. Our version of the student research course integrates teaching and research in a way that satisfies our teaching credit obligations while simultaneously keeping our research endeavors alive.

Research Team: A Curriculum Structured for Student Research
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Academic psychologists recognize that the empirical study of behavior forms the backbone of the psychology curriculum. Virtually every psychology program requires courses in these areas. Unfortunately, at many schools, research courses weed out students seen as having little promise in the discipline. And once students complete the basic research course, they often receive little subsequent exposure or active student participation in research. At Ithaca College, however, our curriculum generates large numbers of students who do more than merely tolerate their exposure to research; they thrive on it.

Their first year involves the introductory course with a lab, followed by a statistics course. But then the real fun begins. Our students take a general methodology course and begin a three-semester commitment called Research Team. This Team experience makes psychological research come alive as a personal experience. Students who are likely to fall by the wayside at others schools participate just as fully as the higher echelon students. The point of the Research Team is to generate novel, programmatic research on a topic. Under the direction of the professor, students work as a team in developing the research question and the methodology for answering the question.

Typically a team will have about four students who are in their first semester, four in their second semester, and four in their third semester. This flow allows upper-level students to mentor beginners and to display the expertise they have developed during three terms. In the third semester, our students have attained a great deal of knowledge of the content area they are researching; they have also learned about the myriad details that a sound research project entails.

A notable advantage of this prolonged exposure to research is that it frees students from the artificial limit of the semester for creating, conducting, analyzing, and writing up their research. We all know that real research takes its own flow; sometimes a semester is simply not enough time. Further, on our Research Teams, students quickly learn that the end of the project is the beginning of a new question. And they have the luxury of another semester or two to study it. It is not unusual for our students to continue with research projects for a semester or two after their three-term commitment. About twenty to twenty-five percent of our students continue their research with independent study.

The Ithaca College Psychology Department has made a commitment of resources to the Research Team program. It is expensive in that faculty receive a course credit for leading a Research Team. The consequence of this approach is that we typically do not have the opportunity to teach other specialized courses, the additional teaching load comprising required classes. In our department, we currently have eight Research Teams on a faculty of 15 full time positions. This means that students have a wide choice of topics that pique their interest, including the study of humor, infant language development, the psychological effects of the media, positive psychology, health psychology, adulthood and aging, neuroscience, and environmental psychology.

The success of the program is manifest. Each year, we send contingents of students to various research conferences where they contribute oral or poster presentations. As a rule, 15 to 25 students make presentations, with other students listed as coauthors. Sometimes the conferences are local or regional, but students have also presented papers at national conventions like NCUR, and have coauthored papers at professional conferences like those of the American Psychological Association, American Psychological Society, and the Society for Research in Child Development, the Society for Experimental Social Psychology, and the Society for Personality and Social Psychology. The Psychology faculty stress that Research Team is not a vehicle for pursuit of faculty research; rather it is a medium for student learning. Their learning progresses most meaningfully when the Team creates a research project.

The Team concept originated in the Ithaca College Psychology Department in the early 1970s. It is paradigmatically consistent with the mission of the College, which started as a music school, and which has always had a robust orientation toward performance. As such, Ithaca College has always been supportive of it. The administration remains pleased with the Department because of the constant, highly visible successes by students.

The faculty members support the program because our students have remarkable success in entrance to graduate and professional programs and attainment of interesting career paths. The students, last but not least, become inculcated in the empiricism of psychology. For our students, psychology means conducting research. Several years ago, one person suggested reducing the Research Team experience to two semesters. Students were equivocal in their response: two semesters was not enough; three semesters of research was necessary. For a psychologist, this is the definition of successful education.

Evaluating Problem-Based Learning in a Nursing Curriculum
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In the health care industry there is a major emphasis on evidence based practice, highlighting the importance of having data to support clinical decisions and approaches to care that are employed in nursing practice. Obviously to have evidence based practice necessitates that we gather, analyze and evaluate information in relationship to our activities. Applying this expectation to the academic arena our challenge as educators is to model that same assessment and evaluation process, using evidence to guide our educational approaches in light of learning processes and teaching pedagogy.

Several years ago we initiated a curricular revision within our nursing division, and in the process identified a need to enhance students' ability to utilize critical thinking processes, decision making skills and active participation in their learning experiences in preparation for the requirements of professional practice. In order to facilitate achievement of this goal we decided to integrate problem based learning (PBL) into our curriculum, and have spent the last five years implementing this teaching-learning model into our nursing courses. It became immediately obvious that the goal and the process were not necessarily synchronous, as student and faculty expectations about what constitutes teaching-learning processes needed to be addressed. Given that PBL represents a dramatic shift from a traditional approach to teaching it seemed appropriate to create an assessment mechanism which would evaluate the strengths and weaknesses of the new model, and would help us to continuously refine our activities, optimizing the outcomes of PBL while helping both students and faculty to adapt to this novel approach to instruction.

We decided to use the PBL groups to assess the PBL process, soliciting the groups' reactions to PBL as an instructional method rather than asking for individual evaluations from the group members. We viewed this as an opportunity for the group to reflect upon what they had accomplished, and as an opportunity to model how to appreciate the process that occurs within a group experience. We began by creating a series of questions that were posed to each PBL group. In order to encourage open participation we selected faculty facilitators not known to the groups and coached them about how to use the questions during the taped evaluation sessions. A separate group was held for faculty facilitators led by a senior faculty member. Using this focus group format we have collected data over four academic years from all sophomore, junior and senior PBL groups. Data has been analyzed by class and across classes, looking for response patterns that reflect student growth and for critique of the process useful to course planning and sequencing.

Using situated learning theory as a theoretical framework to guide our analysis we have learned that the sophomore students are most successful with PBL when faculty takes an active role in building a cognitive scaffold and modeling how to find, apply and evaluate information related to the PBL vignettes. In contrast, senior students develop clear understanding of PBL process over time, and need very little structure from faculty to manage their PBL assignments. They can articulate how PBL has relevance to their practice, and has taught useful problem solving, decision making, public speaking and coordination skills deemed valuable for professional practice. Student feedback has also helped us to refine the timing of PBL vignettes in relationship to content, to define means by which to evaluate the PBL product, making the overall relevance more obvious to the student, and to clarify our roles as the faculty facilitators. The faculty focus groups have supported the faculty to transition from being “talking heads” to becoming part of a developmental process that optimizes mastery of cognitive and behavioral skills are necessary in professional nursing practice.

PBL has been a valuable mechanism by which to support the cognitive growth of our future professionals. In implementing PBL we were faced with the need to define a means by which to assess, critique and refine our activities, giving us an opportunity to model the use of “evidence” in our teaching practice. Through this evaluation process students had the opportunity to experience the outcomes of continuous quality improvement, valued as a practice standard across all disciplines. Using the PBL groups as a vehicle for data collection involved minimal effort on our part. Creating the focus group questions involved group discussions and facilitator training, but the time dedicated to this was modest in comparison to the volume of data obtained. Students are familiar with end-of semester evaluations: accessing the focus groups provided us with an in-place vehicle through which we could gather and evaluate student responses to this specific part of the program. The benefits of the information generated through this research have been invaluable to assess and refine this novel approach to teaching within the nursing curriculum.

Integrating Teaching, Research, and Service Learning for Holistic, Collaborative, and Meaningful Learning,

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Trying to juggle the demands of teaching, advising, committee work and still find time to pursue a scholarly agenda can be extremely difficult, particularly in small undergraduate institutions where faculty members find themselves overwhelmed by competing demands on their time. This time crunch can be exacerbated with the pursuit of innovative teaching strategies, such as the recognition of the pedagogical value of service learning experiences for students. This value was highlighted by the Carnegie Foundation in their Greater Expectations report: "Liberal education for the new century looks beyond the campus to the issues of society and the workplace. Quality liberal education […] has the strongest impact when studies reach beyond the classroom to the larger community, asking students to apply their developing analytical skills and ethical judgment to concrete problems in the world around them, and to connect theory with the insights gained from practice" (www.greaterexpecations.org). The question is how to find the time to offer students enriching learning experiences while still finding time for scholarship.

With a broadly defined definition of scholarship, the actual course assignment or pedagogy of the course, if studied, documented, and assessed, may also qualify as scholarship. Boyer (1990) and Shulman (1993) are leading proponents of a scholarship of teaching that views the act of teaching from the perspectives of design, enactment and critical analyses. What this research suggested to us is that rather than viewing teaching and research as two ends of a continuum, faculty can look for ways to incorporate research and scholarship into our teaching. For example, in upper level courses instead of assigning exercises and assignments designed to build research and writing skills, faculty can treat the students as part of a research team—developing hypotheses, conducting literature reviews, gathering data, analyzing and critiquing the data. This will allow the course to cover the important content, allow the students to gain an understanding of the research process, and allow the instructor to be invigorated by the class while contributing to their scholarly agenda.

In our most recent project we were able to merge innovative, collaborative teaching that included a service learning project that in turn informs our own scholarly research interests in the areas of sports psychology and gender studies, respectively. The project grew out of a discussion about pedagogical challenges to motivate students in courses that build research and writing skills in a meaningful way. Students often divorce what they do in the classroom from real world applicability. Specifically, in some courses, students write surveys or papers without thinking about audience and purpose. These assignments were often viewed as an task done simply for a grade. Although the building of these skills is necessary and important, of course, we felt that we could do more and decided to try and find a way to give our students a real-world community service project that would engage them in research and writing.

Because of an Illinois Campus Compact and The State Farm Insurance Foundation, a grant became available to establish collaborations between high schools and colleges, and we decided to develop a project responding to our specific pedagogical goals. Specifically, the English classes wrote their initial research papers on risky youth driving behaviors (e.g., speeding, distractions, drinking, etc.); the psychology students then looked at this research as they wrote analyzed the surveys to be distributed in the high schools, and finally, the psychology class provided results to the English students to incorporate into their final papers. In addition, the students in both classes visited the high schools to lead dialogue groups about the results of the surveys. With appropriate assessment (Angelo & Cross, 1993; Brookfield, 1995), the results of this project became a meaningful learning experience for the college students, a useful service to the high school, and provided research data from the actual surveys and from the pedagogical assessments for the faculty members. In sum, rather than viewing teaching, service, and scholarship as three distinctive, perhaps even hierarchically opposing entities, this new paradigm establishes a holistic, collaborative, and meaningful learning unit.

References:

Angelo, T A, & Cross, K P. (1993). *Classroom assessment techniques: A handbook for college teachers*. San Francisco: Jossey-Bass.

Boyer, E L. (1990). *Scholarship reconsidered: Priorities of the professorate*. p. 24. Princeton: Carnegie Foundation for the Advancement of Teaching.

Brookfield, S D. (1995). *Becoming a critically reflective teacher*. San Francisco: Jossey-Bass.

Shulman, L S. (1993). *Teaching as community property: Putting an end to pedagogical solitude*. Change, 25(6), 6-7.

Time for Research in a Teaching-Intensive Envrionment: A Course Design

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Ten years ago, time for research was not an issue for biology faculty at Sacred Heart University (SHU). There was no standardized course reduction for research-active faculty, no dedicated space for research activity, and no precedent for external funding of faculty research projects. With a 12 credit (15 contact hour) teaching load, even those biology faculty with interest in potentially low budget field projects found it very difficult to maintain research effort during the academic year. Publishable research activity was simply not an expectation of faculty in the natural sciences. This expectation changed dramatically in the early 1990s, however, with the recognition that student research experience needed to be incorporated into the undergraduate curriculum. Biology faculty members hired thereafter were expected to design research projects specifically for undergraduate participation. I was the first such new hire in 1993, and was followed on almost a yearly basis by additional new tenure-track faculty as our student body grew.

Senior members of the department were instrumental in bringing about this culture change by vigorously advocating for both the space and time resource needs of their junior colleagues. On the department level, research time was carved out by a combination of clever scheduling and curriculum development. Our most creative strategy for providing research time was the design of a new upper division course for biology majors, titled ‘Supervised Research’ (BI390). BI390 departs significantly from the traditional research methods course sometimes required of science majors, and the distinctions impart substantial benefits not only for the enrolled students, but also for the instructor. Traditional research methods courses may enroll a dozen or more students, each ultimately working on distinct research projects. Teaching responsibility for these courses often rotates among members of the faculty from year to year. By contrast, BI390 is enrolled by two or three students per section, and all research-active members of the department offer a section of the course every semester. The course is not a major requirement, but does serve as a major elective. Students enrolled in the course are required to participate in faculty-directed research for 10-12 hours per week and to present the results of that research in poster or seminar format. The questions investigated by the students are based on the instructor’s own research objectives. The students are not bottle-washing assistants, however. They must take ownership for some component of the broader investigation by mastering one or more techniques and independently obtaining data relevant to a specific experimental hypothesis. Most students enroll in the course for a minimum of two semesters, so that they have adequate time to accomplish these objectives. As instructor, the faculty member receives 2 credit hours per semester so long as their course section is enrolled by a minimum of two students.

Compared to the traditional research methods course, the high relative cost of BI390 on a per student basis is apparent. Nevertheless, the substantial positive impact this course has had for both students and faculty is a compelling argument with our cost-conscious administrators. For students, the one-on-one research mentoring and depth of engagement is a transforming experience. For the instructors, BI 390 is time spent teaching. But that teaching is so tightly integrated with their research interests that a substantial weekly block of time results during which he/she is actively thinking about research pursuits. And slowly but surely, if organized with care, undergraduate research teams can generate enough data to contribute to the forward momentum of their mentor's research project.

Our strategy for creating research time would undoubtedly be difficult to implement in a larger department. As our department has grown (from four to eight full-time faculty since 1992), and particularly as new faculty have replaced retiring faculty that were not conducting research, the cumulative impact of the supervised research course sections on regular course staffing has been substantial. Our discipline-specific policies governing faculty-student research are also having a broader influence as undergraduate research is being institutionalized at SHU. The benefits of undergraduate research have become apparent at the highest administrative levels, resulting in initiatives to support such endeavors across disciplines. As major programs in the social sciences, health sciences and humanities begin developing their own faculty-student research models, the issue of creating equitable time for research across disparate fields of inquiry will need to be addressed.

In summary, there is more to 'time for research' than the absolute amount of time available. There are clear advantages to having large blocks of time in which one's only focus is research (e.g. summer or sabbatical). There are equally important advantages to maintaining momentum even if with only a few hours a week. Our version of the student research course integrates teaching and research in a way that satisfies our teaching credit obligations while simultaneously keeping our research endeavors alive.

Recruiting Can Help Jumpstart Faculty Research, Too!

Benjamin D. Caldwell, Department of Chemistry and Director, Western Summer Research Institute, Missouri Western State College, St. Joseph, Missouri

Missouri Western State College is like many public undergraduate colleges and universities in that teaching responsibilities and institutional committees leave very little time for faculty research. Students are our primary focus, but finding time to get involved with our students in research is difficult. To encourage faculty and student research activities Missouri Western initiated the Summer Research Institute (SRI) in 2002, a research initiative with a twist. Faculty members who participate in SRI are required to include entering freshman or high school students in their research plans. The program has four major goals: 1) involve undergraduate students in research and experiential learning activities, 2) provide faculty time and resources to work with students, 3) include incoming freshman students in the college community and research early in their academic careers, and 4) recruit talented high school students.

Participating faculty members lead research teams that include one undergraduate and up to three entering freshman or high school students. Participating undergraduates receive a $1,000 stipend and three credit hours of research toward their major field of study. Entering freshman or high school students receive two credit hours of lower level research, an opportunity to work on research projects with faculty and upper level undergraduates, and a chance to experience college life. They receive student IDs, access to all of the college’s academic resources and technology and recreational facilities. Each team receives a $500 supply budget and the upper level undergraduates act as mentors to the younger freshman and high school students.

In order for the program to work faculty members need time. During the summer many faculty members feel the need to teach summer courses for either departmental or institutional needs, or for their own financial obligations. To give faculty members the time needed for meaningful research they are provide with a tiered stipend that depends on the number of students the team leader is willing to supervise. Faculty members are provided with a minimum of $3,000 to work with one undergraduate and at least one freshman or high school student for eight weeks. The stipend for faculty members who are willing to take on two are three freshman/high school students increases incrementally to $3,500 or $4,000, respectively. (This also offers an incentive for faculty members to involve more freshman/high school students in their projects.)

SRI is designed to encourage faculty members from all academic fields to participate. In 2002, the program began with a modest budget of $29,500 and five research teams including two teams in chemistry, one in biology, one in business, and one in physical education. This allowed for five undergraduate students and fifteen freshman or high school students. During this initial offering not every team was able to recruit freshman or high school students. Rather than disqualify these teams from participating, they were allowed to recruit additional undergraduates in an effort to encourage future faculty interest and demonstrate that the college was serous about supporting the program. Overall, fourteen students participated in the inaugural SRI, including four incoming freshman, three high school students and seven undergraduates. At the end of the program, the students gave oral and poster presentations of their project results at a symposium.

Faculty members have shown an increased interest in the program over the past two years. SRI grew in 2003 from five to seven teams, and the number of student participants increased to 24 students (seven undergraduates and seventeen freshman or high school students). Part of the reason SRI was able to expand with our meager budget was that several faculty participants were able to bring in outside funding (March of Dimes, NSF, NIH) to help support their teams. For the upcoming summer of 2004, SRI plans to expand to eight research teams, and we anticipate increasing student interest and participation once again.

The college administration has encouraged increasing research and scholarly activities by faculty members and students, and SRI has been a very positive effort in that direction. By combining undergraduates with incoming freshman and high school students Missouri Western is offering more opportunities for student engagement and opening a new avenue for recruiting talented students into our programs. The benefits to faculty members are many-fold: time for scholarly work, financial compensation, collaboration with students and the opportunity to bring in good students for the institution and their own academic programs. Although funding is still limited and we are experiencing growing pains, we are encouraged by the reception SRI has received from the administration, the faculty, students, area high school students and the community. For institutions searching for ways of stimulating faculty and student research efforts Missouri Western's Summer Research Institute can serve as a model for integrating research through the entire college community.

Finding Time

Suzzette F. Chopin, Department of Biology, Texas A&M University-Corpus Christi, Corpus Christi, Texas

Finding time for research is a problem at all institutions, but is particularly frustrating at undergraduate institutions focused on teaching. In the College of Science and Technology at Texas A&M University-Corpus Christi, we believe that research opportunities for undergraduates are a means to fulfill our teaching mission. Less than ten years ago, we added freshmen to our junior, senior and graduate student population. Formerly a primarily teaching institution, we began to improve our research ability. We combined our teaching commitment with our research initiative. Fostering faculty research directly benefits students by creating opportunities for experiences in hands-on, hypothesis-driven research. Undergraduate research builds self-confidence, translates content into action, and increases students' interest in science. We have been able to promote undergraduate research because we have a supportive administration, committed faculty and faculty development activities.

A Supportive Administration

Our college dean informs newly hired faculty members that they are expected to establish an active research program that includes undergraduates. In addition, mentoring of undergraduates is a major criterion for merit increases, promotion and tenure. Additional efforts by our dean have been instrumental in securing funding for research release time, supplies, equipment and conference travel. New faculty members are given 25% research release time for their first year of employment. Thereafter, they, along with all other faculty members, have the option to request 25% workload release for research. A faculty committee evaluates the merit of the request and forwards its recommendation to the dean who grants the release time, if an adjunct is available or if the course can be omitted that semester. This approach has resulted in significantly more external funding. For example, in 1993 and 1994, our faculty received $3,356,687 in contracts and grants. By 2001 and 2002, that amount totaled $16,298,361.

Also, our university-funded Faculty Enhancement Grants can pay summer salary, purchase supplies and provide wages for research assistants. A faculty committee reviews the proposal and makes its recommendation to the dean who generally supports the recommendation.

Thus, faculty members have two institutional avenues to carve out time for research: workload release can provide up to 25% release for fall and spring semesters and the Faculty Enhancement Grants can provide up to 50% summer salary.

A Committed Faculty

Our program of undergraduate research developed because a few dedicated faculty members "donated" an extraordinary amount of their "free" time to mentor undergraduate researchers. Students spread the word to other students, piquing their interest, and providing an impetus for more faculty members to become involved. Our biggest roadblocks were instituting a research culture and overcoming faculty skepticism about undergraduates' research abilities. As more students became involved in research and began winning awards for their work, this skepticism decreased. Organizational change is always difficult, and this new endeavor had the potential to thrust our faculty members into new, uncharted waters. To overcome this obstacle, we designed faculty development opportunities to help our faculty members navigate these waters.

Faculty Development

We provide training opportunities to encourage our research initiative and to improve teaching and mentoring skills. For example, we recently hosted two events focused on faculty development. The Federation of American Societies of Experimental Biology (through their NIH-funded Minority Access to Research Careers grant) sponsored both events at no cost to us. Faculty members participated in a two-day "Write Winning Grants" seminar, which detailed how to write successful proposals. We also hosted Howard Adams, Ph.D. who delivered a presentation on "Mentoring: a Proven Strategy for Success." These are our most recent examples of faculty development activities.

Undergraduate Research Symposium

For the last three years, we have produced an Undergraduate Research Symposium, where students present their research, vie for monetary awards and hone their presentation skills. The $15 registration fee plus funding from our college and the South Texas Chapter of Sigma Xi underwrite costs. An Outreach Grant from the American Association of Anatomists helped fund our first Undergraduate Research Symposium in 2001. Many professional societies offer grants for such opportunities, and provide start-up funding for a variety of events targeting undergraduate education and research.

Recognition

In 2001, our university was designated a National Role Model Institution by Minority Access, Inc. and in 2003 we received a Star Award from the Texas Higher Education Coordinating Board. Both awards were recognitions of our success in recruiting, enrolling, retaining and graduating minority students and placing these students into graduate and professional schools. We believe our initiatives in fostering undergraduate research were fundamental to our success.

Conclusion

Undergraduate research plays a pivotal role in our teaching mission because it translates into improved retention and graduation rates, as well as increased matriculations into graduate and professional schools. Such outcome measures of success resonate with administrators, encouraging them to be more favorably disposed to funding faculty research and to supporting research release time.

Promoting Research at Immaculata University
Sister Marie A. Cooper, Director of Sponsored Research,
Sister M. Carroll Isselmann, Vice President for Academic Affairs
Immaculata University, Immaculata, Pennsylvania

Immaculata University is a comprehensive institution, originally founded in 1920 as a Catholic college for women and now consisting of the College of Graduate Studies, the College of Lifelong Learning, and the Women's College. The faculty of the Women's College believe strongly in research as a learning experience, and come from research backgrounds. As with most liberal arts undergraduate institutions, teaching schedules make finding time for research a challenge.

For a number of years, the administration of the university made faculty development and faculty incentive grants available through a proposal and peer review process. The small grants were usually fully subscribed but too small to provide the time needed for research projects. In the spring semester of 1998, the Women's College at Immaculata received an Extramural Associates Research Development Award (EARDA) from the National Institutes of Health, a program designed to enhance the research infrastructure at minority and women's colleges/universities. EARDA provided a semester of training in research administration to a science faculty member, provided the help necessary to set up Immaculata's Office of Sponsored Research, and provided up to $35,000 per year in funding for faculty/student pilot studies from 1999 through 2004.

The pilot studies, dubbed mini-grants at Immaculata, provided the single greatest catalyst for change in the research enterprise. Faculty members and, in two cases students, submitted proposals modeled on the format for a full NIH proposal, but on a smaller scale. Peer reviewed by at least three persons, the grants offered up to $7,000 per project for mentored research in the biomedical or behavioral sciences. Research experiences have been challenging and rigorous. Funds were used for released time, equipment and supplies, summer stipends for student researchers and faculty mentors, and limited travel funds for presentation at professional conferences.

The EARDA mini-grants generated eagerness for research in students and faculty alike, and faculty sought support for broader opportunities. The university solicited and received a grant that extended the mini-grant model into the area of globalization, providing funds for time and resources for curriculum development and mentored student research. Immaculata continues to seek funds to support faculty released time and stipends for research in all areas.

Internally, the administration has significantly increased the funding available for presentations at professional conferences. The administration and the staff of the Office of Sponsored Research actively market and advise faculty of opportunities. This year the Vice President for Academic Affairs published a faculty development brochure outlining opportunities for grants and special institutional support mechanisms, and the Vice President and the office work to help faculty leverage grant money to increase available time, including the hiring of adjunct faculty.

A new level of enthusiasm pervades the university.

These six years have seen a dramatic increase in:

- mentored research projects,
- students seeking and gaining summer research opportunities on other campuses and at non-academic research facilities,
- students seeking research careers, and
- faculty members and students presenting juried papers and posters at local, regional, state, and national conferences, including participation in CUR's Posters on the Hill in two successive years.

Faculty members are seeking external grants both for research and for outreach, and are establishing collaborations with other institutions. Two faculty members, from the departments of biology and education, sought and received funding from the National Science Foundation for a residential summer program for high school girls in bioinformatics. The program gained broad attention and was expanded two years later, under private funding, to encompass robotics and information technology as well. The faculty members involved have submitted an article on the projects for peer review and possible publication. The university serves as a resource for funding information to the consortium of eight colleges/universities to which it belongs.

The return on the investment in time availability has been extraordinary and far reaching. It offers a new vision of the future for the university, its faculty, and its graduates.

When it is TIME to leave?

Mary Crowe, Director, Center for Undergraduate Research, Xavier University, New Orleans, Alison Morrison-Shetlar, Director, Karen L. Smith Faculty Center for Teaching and Learning, University of Central Florida, Orlando, Florida

Everyone has contemplated leaving their current institution at some point in their career. How do you know if it is time for you to act on your thoughts? Both of us have recently accepted jobs at different institutions from where our initial faculty appointment occurred and where we received tenure. We hope that our collective thoughts can help you decide whether it is time to look for greener pastures. This essay is for the faculty member who has been relatively successful at their institution, probably has tenure and is at that point in their career where they think, "Is this the best that is out there?"

IT IS TIME TO LEAVE WHEN:

UNEXPECTED OPPORTUNITIES PRESENT THEMSELVES

Get involved in professional organizations, both within and outside of your discipline. In discipline-based societies, lead a committee of interest to you. You get to meet a variety of people who can then recommend you for intriguing positions when they come up.

YOU THINK YOU HAVE REACHED YOUR MAXIMUM POTENTIAL AT YOUR CURRENT INSTITUTION

You will know this is the case if you volunteer for positions or committees in which you feel you have the expertise and passion to do a great job – and yet you are repeatedly overlooked. Look closely; are more qualified persons given the coveted positions/committee assignment? Can those people do a better job than you? If so, stop pouting and work harder on the skills that will help you move ahead at your institution. If, however, you apply for the director of undergraduate research center and a person who has not published a paper, applied for grants or supervised undergraduate research gets the job, it's an indication that it may be time to move on.

YOUR INSTITUTION HAS EXPERIENCED A MAJOR SHIFT OF RESOURCES AWAY FROM ACADEMICS

More experienced colleagues will tell you that things move in cycles, so you can wait as your turn will come. However, if your division was under-funded in the past and a capital campaign has been announced to build a new football stadium, it may be time to find a new job.

YOU HAVE A REALISTIC EXPECTATION OF WHAT LIFE AT ANOTHER INSTITUTION MIGHT BE LIKE

Every department struggles with teaching loads, resource allocation and difficult personalities. How does your institution compare? Ways to find out include: talking with trusted colleagues at other institutions; serving as a CUR reviewer or on an CUR institute team; personally visiting other campuses while you give a talk or investigate a potential research collaboration.

"OPPORTUNITIES" BECOME PROBLEMS IN YOUR MIND

Suppose you are at an institution that has historically valued the teacher-scholar model and involving undergraduates in your research program. At a departmental meeting, you find out that administrators have identified new pools of funding for research, with the caveat that you either focus on local community issues or involve community members. If you can easily think of ways to do this, it is not time to move. And, if you learn that research with undergraduates is no longer valued, it is time to look elsewhere.

THE LIST OF WHAT YOU LIKE ABOUT YOUR CURRENT POSITION IS MUCH SMALLER THAN THE LIST OF YOU DISLIKE

Review your list; is it possible to make the best of a bad situation or fix what is broken? Can you learn to deal with the circumstances at hand, with the hope that things will change over time?

YOU CANNOT IN GOOD CONSCIENCE BE POSITIVE ABOUT YOUR CURRENT INSTITUTION TO PROSPECTIVE FACULTY MEMBERS

It is always best to talk to people about your institution in a positive way but if you have reservations about your institution and the direction it is going, do not say anything at all. What might be a negative for you may be the ‘grass is greener’ for others. Make sure you have colleagues (at other institutions) that you feel you can talk to honestly and openly about your situation at your institution. Seek their advice and counsel. Talking with them can help you evaluate your own fit with your current institution.

YOU ARE GIVEN AN OFFER YOU CAN'T REFUSE

If decide to apply to other positions, be selective. Only apply for jobs that truly interest you so that when they offer you the moon, the stars, a nice fat salary, moving costs and a job for your spouse you find the courage to move.

If you do test the waters and find a job at another institution, the best time to leave is when everyone is still singing your praises. Try to leave your current institution on the best terms possible, as you never know what the future brings. Do not burn your bridges. There is nothing to gain and former colleagues could be harmed.

Making Time for Research by Ruthless Course Scheduling
Kathryn Goddard, Department of Biology, Ursinus College, Collegeville, Pennsylvania

Careful course scheduling creates more time for research in both obvious and more hidden ways. This semester, I was able to schedule all of my courses for Monday, Wednesday and Friday. This required flexibility on the part of the registrar and my department chair: they scheduled me to teach two classes on Monday, Wednesday and Friday morning. In addition, I needed to schedule a third lecture class and a laboratory. They allowed me to schedule the lecture class on Monday and Friday for 1.5 hours each. That schedule allowed me to put a lab on Wednesday afternoon. There were no student complaints, and my courses are filled, so apparently this did not create a scheduling problem for students.

Tuesdays and Thursdays are glorious. I have no classes on those days. Of course, having the whole day allows me to schedule lengthy protocols, uninterrupted by classes. No electrophoresis gels run off the end and no columns run dry! I do not have to glance at the clock on the lab wall every few minutes to see whether it is time to go to class. The fact that I have two open days each week has allowed us to progress much more quickly in our research than usual.

I have gained more time than one would think by simple calculation. When writing time is interspersed with class time, I work a little…go to class…come back and try to find the spot I was working on… work a little, and try to find my place again after the next class. I spend time doing the same things over and over each time I start to work anew. With large blocks of time, I can take a break when it is natural in the writing and thinking process, instead of when I am in the middle of a section that requires my full attention.

I have discovered many other reasons that reserving large blocks of time for research is beneficial. On Monday and Wednesday night I have no lectures to prepare. This has given me a different mindset, I feel more relaxed. This gives me time to think, to write recommendations and papers, including vignettes for the *CUR Quarterly*. There is plenty of time to write the lectures on the other nights by just staying on task.

An all Monday, Wednesday, Friday schedule is hard to arrange. Here are some alternative schedules that are also salutary to maximal research time:

- One full day open for research each week with no classes.
- Full afternoons or mornings
- Teaching the earliest class of the morning, 8 AM for example, so that the remainder of the morning can be devoted to research.

Once that coveted research time is found, one must not be tempted to consent to filling that day with committee meetings!

This semester, a parade of undergraduate research students come in all day Tuesdays and Thursdays as their schedules permit, and I can give each one of them a cheerful hello and my full attention. I can teach them what to do and why, rather than tossing them a protocol book, running off to class, and hoping against hope that they will not burn themselves or melt some piece of equipment. This semester, I am talking to them more about career, summer fellowship, and internship opportunities than I ever have before. In addition, we can also schedule field trips to visit local pharmaceutical firms more easily on Tuesday or Thursday. My students are getting much more of a feeling of a graduate student's research experience, and I think this will encourage more of them to consider careers in research.

Reassessing Workload in an Undergraduate Program

Scott Hawke, Susan Kephart, Gary Tallman, Department of Biology, Willamette University, Salem, Oregon

Institutional Context

Faculty and administrators of Willamette University are actively engaged in ongoing discussions designed to reduce faculty workload. These conversations reflect a strong desire to create more time for scholarly and creative endeavors, which also synergistically enhance the learning environment. Faculty are increasingly aware that to foster a community of research-active faculty, and to mentor the kind of collaborative programs that students and faculty now desire, the class contact-hour teaching load must be reduced.

In the sciences, a decade of CUR surveys by Hoopes (1990), Reiness (1991), and Wenzel (2001), reveal that science faculty members cannot sustain vital research programs if the number of teaching contact hours exceeds 12 per week. Yet at many liberal arts institutions like Willamette, contact loads in the sciences commonly exceed 15 hours per week. So, how can individuals, departments, and institutions with limited resources design solutions to the workload problem without compromising pedagogical goals?

This article briefly describes the current plans for reducing workload in biology and across the curriculum. The intent is to increase collaborative research activity and productivity for faculty members and students while retaining our tradition of excellent teaching and service. Additionally, the administration asked all departments to define curricular and staffing changes for a shift to a reduced faulty workload.

Department of Biology

In the biology department, wide agreement exists that students must be challenged by a science education that is experimental and investigative throughout their undergraduate years. This approach is evident in core courses that introduce experimental design, statistics, and scientific symposia, and in writing-centered, research methods courses taught in each faculty member’s expertise. Empirical and theoretical elements are evident across our curriculum, which balances evolutionary biology, systematics, and ecology with cellular physiology, genetics, and molecular biology. Most importantly, we seek to establish a community of student and faculty scholars in which hands-on, collaborative learning is the rule rather than the exception. Although our pedagogy no longer emphasizes “canned” laboratories, the time demand created by inquiry-based learning is not compensated by fewer contact hours. If we expect faculty members to sustain a program of research with undergraduates, to demonstrate publication levels adequate for tenure and promotion, and to secure extramural funding for laboratory teaching and research, the present contact hour load must change.

The department suggested the following ideas to readjust the teaching workload from 4 courses (3/3) to 3 courses (3/2) over a two-semester school year for each faculty member.

- decrease total courses dedicated to general education
- assign teaching credit for directing collaborative research with students
- provide credit for teaching laboratories independent of lectures
- encourage team-teaching
- grant credit for leadership in a biology colloquium
- add a tenure-track and part-time adjunct positions
- provide incentives for extraordinary service to the university or wider community

Load Relief Across the Curriculum

Support for a change exists among faculty across the College of Liberal Arts as well: in a recent survey a majority of the faculty sought to increase the time spent on scholarly endeavors, and in independent study with students. The top two proposals favored by faculty members were to shift to a reduced load as soon as possible and to shorten the time between sabbatical and leave opportunities. Such options for reducing faculty load must occur across the ranks, so that a) junior faculty have good models as they move toward associate and full professor, b) students interested in all subfields of a chosen major have research-productive and teaching-active faculty members as effective mentors, and c) senior faculty members have time to administer large grants and lend experience and guidance to junior faculty members during their initial attempts at research, teaching, and grant-writing.

Higher national demands for student assessment have increased faculty workload in the area of service and the need for compensation. However, programs providing release time for committee service are difficult to apply equitably, as faculty efforts vary individually and with committee tasks. Alternative tangible incentives for exceptional university or community service are also attractive and save faculty time (e.g., credit toward earlier sabbatical, travel awards; more frequent options on new computers or equipment; funding for workshops that train faculty in new techniques). Such one-time gifts conserve university resources yet recognize service in significant ways and increase faculty effectiveness.

Closure

Universities invariably exhibit long periods of stasis punctuated by change, analogous to the equilibria of evolutionary paradigms. Our ideas show promise for reducing faculty members’ workload with minimal budgetary costs. However, full course reduction for faculty is inextricably linked to offering students an innovative curriculum and is not possible without new hiring. Without it, we cannot expect our faculty members to be research productive nor to maintain and enhance a university standing of national prominence and excellence.

Graduate Faculty Members at Northern Michigan University are Expected to be Involved in Research – but in the School of Education, it's not just Required, it's Inspired!

Kathleen M. Heikkila, School of Education, Northern Michigan University, Marquette, Michigan

Since arriving on board as the Assistant Dean of the College of Professional Studies, Dr. Debra Thatcher has created both physical and collegial support for inquiry. Faculty schedules are adjusted so each member has at least one day free of teaching each week. All faculty members are given the opportunity to have a Freshman Fellow to assist with research. A student work position in Technology Support was created, so faculty members could learn new hardware and software in a risk-free environment. And when my current research focused on a local elementary school, I was given permission and support to conduct both office hours and university courses on-site.

These supports have not been painless. Tinkering with class schedules requires quarterly negotiations with other departments on campus. Changing class locations means students have to be presented with the concept of "action research" and encouraged to participate. And budget constraints require a monthly focus on what's the cake and what's the icing. Watching Dr. Thatcher negotiate these whitewater rapids has been almost as educational as my research! But when all is said and done, I know that the only true barrier to research within our department is one's willingness to simply ask.

Temporal Matching: Longitudinal Designs and Teaching Institutions
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When I began my graduate training in psychology, I learned at a whole new level how the research designs and methods we use to collect our data shape the questions we ask and the answers we receive. During my graduate training, a variety of methods were emphasized as maximizing various desiderata—the experimental method maximizes precision in results, naturalistic observations maximize contextual realism, and surveys maximize the generalizability of results, for example. And though a psychologist might wish to have all three of these desiderata present in his or her empirical results, no single method allows all three to co-exist. The solution, of course, was to use multiple methodologies when investigating one's area of inquiry.

My first tenure-track position was not at a predominantly undergraduate institution, but at a large research university. As any young faculty member who was hungry for tenure and interested in contributing to the scientific literature might, I set up my laboratory and proceeded to begin carrying out a research program focused on my scholarly area of interest—group process. Research on groups has historically been full of one-shot, experimental designs that favor precision and control over realism and generalizability. The result of this methodological bias is that a great deal of information exists about the precise cause and effect relations between sets of variables, but a great deal of information is lacking about how likely it is that these relations occur in natural groups that occur outside of the laboratory and exist for periods longer than the experimental hour. The more I studied groups, the more I realized that one of the most important contributions I could make to the field was to move my research in the direction of studying more natural groups that have a history and a future, and determine if those precise results had any validity in richer, but less controlled, settings.

Yet I found this goal incompatible with the pressures to publish at a large research university. The pressure for a large "number" of publications was so high that I felt I had to engage in one-shot studies in the interest of time on the tenure clock. Longitudinal studies by their very nature take more time than 50-minute experiments. To adequately design, execute, and then disseminate such a project would result in fewer publications during the probationary period than I was going to need to earn tenure at that institution. To move my research in the direction it needed to go, I needed to move to an institution where longitudinal studies would not work against me on the tenure track.

A predominantly undergraduate institution is where my research program has developed and flourished. I moved to a place that had undergraduate research as part of its core mission. In this setting, I have focused on developing cooperative work group projects as part of each course that I teach. Groups meet weekly to work on projects related to the course material, and their meetings are videotaped. I study these groups over the course of a semester and measure numerous things about them—performance on quizzes and assignments, cohesion levels, and so on. I am also able to compare groups that are part of a larger "learning community" network to groups that are not. I am able to devote time to theory development that wrestles with how experimentally-derived results correspond, or fail to correspond, to the results obtained in these longitudinal designs. And consistent with my institution's core mission, I involve undergraduates in a various stages of the research process—less experienced undergraduates are trained to assist with simple coding of group process, more advanced undergraduates assist with data collection and entry, and the very strongest students may even contribute to the research questions, analysis of data, and dissemination of results.

In a sense, research on naturally occurring groups—especially the labor intensive coding involved in studying a group's process—is better situated in a predominantly undergraduate institution. In such a setting, the fact that I have produced fewer publications than I might have during the probationary period is not a professional disaster. The pace at which my work is expected to move is commensurate with the pace at which longitudinal studies do move. Having to teach four classes each semester actually helps me conduct these longitudinal studies because they provide me with additional sets of observations. By finding ways to integrate my scholarly interests into the way I structure my classroom, and by realizing that a temporal match between my scholarly goals (longitudinal research) and professional goals (earn tenure) was possible, I have more than sufficient time to conduct the research that I love to do.

Partnerships for Undergraduate Research

Mary Lou Hightower, Department of Fine Arts and Communication Studies, University of South Carolina Spartanburg, Spartanburg, South Carolina

Developing a partnership with a neighboring museum can produce a unique opportunity for undergraduate research. This is the case for the University of South Carolina Spartanburg and Museum of York County. This partnership developed from a conversation at the South Carolina Art Education conference between me and the curator of art, Mary Lynn Norton. Mrs. Norton had recently acquired a large collection of Southern Folk Art by a local donor. Because of a small museum staff, the 87 pieces had not been fully documented and digitized. An agreement was reached to assist the museum in the researching and documenting the new collection using an honors art history class that was scheduled to study Southern Folk Art.

The honors class was a perfect match for the partnership because of its small enrollment capacity and the students' abilities for research. The project was also assisted by a grant from the USCS Student Affairs in order to promote diversity on campus through the study of the folk arts in the area.

The honors art history class was assigned the responsibility to catalog, digitize and research the art works held in the Museum of York County. Each student was given the task to interview two of the 23 living artists of the collection. This task could be achieved through various avenues such as phone, letters, email or in person. Besides the interviewing and writing a summary article of conversation, the students were transported to the museum to work for two full days to catalog and digitize the works. This project required the students to work in teams to measure, record, clean, and photograph each artwork in the museum repository. As the students began working with artwork from an artist they had researched, they began enlightening the rest of their team about the artist background. One student, Brandon Lyles commented," this experience is a good first step into what we want to accomplish as a group and further develop our skills as new students of folk art."

This partnership was successful venture for both parties. The undergraduates had extraordinary experience discovering the inter-workings of a distinguished museum and the opportunity for ethnographic research with a folk artist. The museum received volunteer labor to catalog a special collection that will be a hallmark in the community for the future.

Creating Time by Recreating Culture: Lessons for Fledgling Undergraduate Research Programs

Paul Hooker, Bonnie K. Baxter, Brian Avery, Sciences Division, Westminster College, Salt Lake City, Utah

An institutional commitment for engaging students in undergraduate research requires the investment of considerable time and effort from faculty members, as well as financial backing by the administration. The familiar adage that “time is money” could not be truer for undergraduate research programs. Any act that allows for more time for primarily teaching faculty to conduct research or supervise student projects has a direct financial impact on the institution. At colleges without a history of undergraduate research, what can faculty members do to build an effective program that requires such a large commitment of time and money? This article argues that developing a relationship between faculty members and the administration has been instrumental for the procurement of the two valuable resources; time and money.

Westminster College is a small liberal arts college in Salt Lake City with a total enrollment approaching 2500. The idea of an undergraduate research program was born six years ago as a result of persuasive and passionate arguments from new faculty members. This effort would have been fruitless without significant support from the administration, as it required a paradigm shift for an institution that had traditionally focused on classroom teaching. The culture of Westminster needed to change.

The first phase of change was education. External data (from CUR) on faculty load distributions for class, lab, and research time was an invaluable tool for the faculty making arguments to our dean. However, the hiring of an external consultant (a dean from a college with a strong undergraduate research program who was active in Project Kaleidoscope and CUR) was pivotal to convince the administration that undergraduate research was essential for any institution that aspired to be ranked in the top tier of colleges in the United States.

The next step was implementation. Incorporating research projects into existing courses is a cost and time effective solution for exposing students to the scientific process of research. The advantages are that a relatively large number of students benefit, and that competent and motivated students can be identified for further research activities. Drawbacks are that the projects are not long enough to get a realistic experience of research and that the faculty member who teaches the course is required to be a multitasking wizard!

The summer months provide us opportunities for research as time, space, and instrumentation are available. Currently, faculty members supervise one or two students and can apply for a modest stipend, but many have worked for no compensation. For the past three years the summer months have been the most productive in terms of student research projects, the results of which are now routinely presented at internal poster sessions and national conferences. This sacrifice of time and money by faculty members has resulted in not only awards and accolades for the college in which the administration can delight, but also in preliminary data that has aided faculty in applying for external grants.

What's next? Reducing teaching loads is an obvious solution for freeing up faculty time, but there are barricades for administrators including direct financial impacts and the perspective of inequitable treatment of faculty members across the college. We are taking a small step forward next year as the issue of under-compensation of faculty members for lab teaching time (0.5 load hours for every 1 contact hour) is being addressed. National data backing faculty arguments resulted in our dean's support of 0.75 load hours per contact hour for lab, with the possibility of receiving equal time in the near future. Equality of load will enable faculty members to schedule days without classroom time, thereby freeing up significant time for research during the standard semester. Next year, our dean will approach the issue of load credit for supervising students in research.

In retrospect, Westminster would not have seen such progress in undergraduate research without committed faculty members willing to take on extra responsibilities with little or no compensation. The energy and dedication of the faculty to provide research experiences for students has been recognized by the administration, who have been able to provide the financial resources. The costs are significant, including funds for team taught classes, student and faculty stipends, travel stipends for presentations at national conferences, and start-up funds for new faculty members. However, undergraduate research is now so firmly entrenched in the culture of Westminster College that it has been incorporated into the new strategic plan of the college and is playing a central role in our design of a new science facility. While we recognize that we have not yet created a research nirvana with issues such as faculty compensation and load issues still to be resolved, we are optimistic about the future.

Student – Faculty Research
Maryanne Hunt, Department of Psychology, Rollins College, Winter Park, Florida

Rollins College is a small liberal arts institute in Winter Park, Florida. As such, we have limited resources for conducting research, the most precious of which are time and warm bodies. Of the 1600 arts and sciences students, about 10% are psychology majors. As a physiological psychologist that puts me in competition with my fellow psychologists, and colleagues from other disciplines, for the hearts and minds of the "would be" scientists. Fortunately, Rollins offers a unique program that insures one will at least have the opportunity to influence and shape this potential.

The "Student-Faculty Summer Scholarship Program" is designed to create a partnership between one or more students and a faculty mentor for the purpose of conducting research. It provides stipends for the students and faculty members as well as some funds for supplies or small equipment. Participating students are also permitted to live in the dormitories free of charge for the eight week period. It is the perfect opportunity to engage students in original research at a time when neither party is heavily embroiled in classroom work. Students spend full eight-hour days "on the job" and projects are supported for six or eight weeks. This is rarely enough time to finish an entire project but it is more than adequate to pilot new research or conduct intense data gathering for already established projects. I usually have sophomore or junior level students who can then continue the research during the school year. It is imperative that the student be adequately trained so as to function independently and be able to train assistants.

For example, I conduct psychopharmacology research with rats. During the summer of 2001, I taught a student to train rats in a specific memory task. The task is a difficult one and acquisition can be slow, requiring four or more hours per day in training alone. The student was able to train enough animals to provide the baseline information for the rest of the project. She continued the next phase of the project during her senior year and taught less experienced colleagues to train the next group of animals. The trick is to find a mature, dedicated student and a way to partition a project into small manageable experiments.

Perhaps the biggest obstacle to the smooth execution of research is the class schedule. For students, this is not a malleable subject. I begin my fall recruitment with sophomores and a schedule of possible lab times. Interested students are told they must be free during specific hours or they cannot participate in this particular project. Only rarely is there a student who cannot make it to even one of the scheduled times. For this rare person, I usually find a weekend or evening period when they can assist with data analysis. Each student is then assigned to a team of two or three. That team is responsible for a particular group of animals for a set time period. As there are multiple team members, only one member need be available on any given day. This makes the project seem less demanding and gives the students an opportunity to learn to work as a team. I rotate the teams so as to avoid experimenter effects.

As for my schedule, I am fortunate to work with colleagues who are also dedicated to the student research experience. Consequently, we cooperate when arranging class times. We are usually able to stagger our classes so that we are teaching Monday, Wednesday, and Friday during one semester, and Tuesday, Thursday during the next semester. By cooperating, we are all able to have blocks of time that can be devoted to working with the students in the lab.

The Value of Student Presentations at Professional Conferences

Lew Ludwig, Department of Mathematics and Computer Science, Denison University, Granville, Ohio

We are fortunate at Denison University to have an active undergraduate research program [1]. Every summer, over 100 of Denison's 2000 students receive financial support to spend their summers working with Denison faculty members on various research projects. This active program was one of the reasons I joined Denison's mathematics and computer science department in the fall of 2002.

Although we have a very active undergraduate research program, I was surprised at the relatively small number of students in our department that presented their work at regional or national meetings. After my first semester at Denison, I found out why. Simply put, faculty members are too busy with their courses and their own research. There is little time to prepare students for a quality presentation of their work. Nonetheless, I was determined to share the fine work of our students with the larger community. I convinced a willing junior to present at the spring sectional Mathematical Association of America (MAA) meeting. The week before the meeting, I prepped him, closely following the guidelines in Gallian's indispensable article "How to give a good math talk" [2]. Several times during this grueling period, he wanted to give up – there was not enough time. Through the proverbial blood, sweat, and tears, we persevered and he delivered a very nice talk that was well received.

Although this was a time intensive and stress-induced exercise, I thought it was worthwhile. The question remained: How could we best prepare our students for presentations without consuming large amounts of valuable time? In the fall of 2003, I was to teach our Introduction to Proofs course – a sophomore level course for math majors. This course provides the main pool of potential research students in the coming summers. Instead of preparing students in the art of presentation after their research experience, I decided to do it in advance through this course. A student would pick a mathematical topic new to him or her, "research" it, and present a fifteen minute expository talk to the department by the end of the semester.

In the planning stages, this sounded like a great idea. By the end of the semester, each student would have a mathematical talk ready that could easily be presented at a regional meeting. However, after witnessing student homework presentations at the board, I realized the students had little experience speaking before a group or gearing their material to the level of the audience. Without the possibility for improvement, this semester project was destined for disaster.

Fortunately, the mathematics and statistics department at Miami University, Oxford, holds an annual fall conference that highlights student presentations through the mathematical honors society, Pi Mu Epsilon. With support from Denison, I was able to take seven of my eight students to the conference. They were required to attend various talks and write critiques on two: that of a student and that of a professor. This was an eye-opening experience for my students. They saw a variety of talks on a range of topics. They finally began to understand the components needed for a good talk as discussed in Gallian's article.

The students' board presentations improved markedly after the Miami conference. To further develop their presentation skills, I gave each student two short and accessible articles from *The College Mathematics Journal*. Students presented these to the class throughout the semester and received written feedback from me and their classmates. Needless to say, the students did a fine job with their final presentations before the department. Other faculty members praised them for their delivery and content.

At this point, one may ask how a few expository talks in a sophomore level math course encourage undergraduate research. Of my eight students, three will be conducting research this summer in our department – two as a direct result of their experience in this course. One secured a grant funded by the Howard Hughes Medical Institute. In her proposal, she noted that she considered pursuing research in mathematics only after her experience in the Introduction to Proofs course. In addition, two of these summer researchers, as well as two other students from the course will present their material at the spring MAA Ohio section meeting. We will also have two seniors and three freshmen presenting. Thankfully, due to the Introduction to Proofs course, it will take us minimal time to prepare these students for their talks. By spreading the techniques of presentation over the semester, this approach has proven itself to be a true time saver – something we could all use.

References:

[1] Boone, C. Keith, *Entering the Community of Scholars: Summer Research at Denison*, Council on Undergraduate Research Quarterly, March 2003, 113-115.

[2] Gallian, Joseph A., *How to Give a Good Talk*, Math Horizons, April 1998, 29-30.

Making Space (if not time) for Research
Judith T. Lysaker, Department of Education, Butler University, Indianapolis, Indiana

Sarah sits cross-legged on the floor guiding Marcy at a low table as she glues pictures in an alphabet book she is creating. “Good you’ve finished your ‘G’ page. Nice job. Would you like to read with me now?” Sarah is participating in her practicum placement for her kindergarten course at Butler University. She is also beginning some data collection on a project documenting the wordless book readings of young children. Both the kindergarten course and the early literacy research are elective experiences for Sarah who is interested in learning all she can about young children and their literacy development. This overlapping of student experiences is one way to make space, if not time, for research.

As an assistant professor in the College of Education at Butler University I spend several hours a week in public schools supervising practicum experiences for our education students. Field experiences, as we generally call them, are central to our students’ educational experience as they work to become teachers. However, regular time in classrooms is also an opportunity to pursue research. This semester I am engaged in a research project in early literacy with fourteen undergraduates. These students are all former students of mine, who having completed their literacy methods courses with me and wanted to continue their inquiry into literacy learning. At the time I was planning a study of young children’s readings of wordless picture books. Though I had intended to begin the study at a later date, with fourteen interested students I took up the challenging of beginning earlier! Luckily ten of the fourteen students were concurrently enrolled in a kindergarten curriculum course which required them to be in a kindergarten classroom six hours a week. By collaborating with my colleague who teaches this course, I was able to set up the research project within the kindergarten practicum experience. Though I am carrying a full teaching load in addition to this research experience, the coordination of this project with another class reduces the management aspects of the research to a considerable degree, offers me professional opportunities and allows me to work with both college student researchers and kindergarten readers. All are critical to my own development as a faculty member at Butler.

Undeniably the project is time intensive. I spend time each week in the kindergarten classrooms with the students, checking in, answering questions and observing their interactions with children. However, the time in the classroom is crucial in terms of supervising the research, and because it allows me to observe and coach students individually as they simultaneously work with children and collect data. Together we problem solve data collection issues, raise questions about children’s literacy needs and abilities, and even begin informal data analysis as we talk about what we think our data means. This merger of teaching and research is so valuable for education students. It gives time to reflect on inquiry as a natural part of teaching and to see information gathering as central to knowing and teaching children. It also gives them time to consider issues and dilemmas of working with children.

In addition to working with students in the process of the research in classrooms, I also meet with them once week at the university I order to gather organize and reflect on the week's data collection. Here students have opportunities to discuss within the research group how things are going. To ask questions about procedures, to offer interpretations of children's readings and to purse hunches of their own as they begin to see themselves as teacher-researchers.

Finding time for research is a challenge. For me, the blending of teaching and research is one way around the dilemma. It is also a meaningful way to engage students in learning about what it means to be an educator. Now as for time to write………

Creating Time for Research with Undergraduates at a Graduate Research Institution

Patricia Ann Mabrouk, Department of Chemistry & Chemical Biology, Northeastern University, Boston, Massachusetts

If you walked into my research laboratory this semester on a typical afternoon, you might see the following: chemistry senior Gabe is busy polishing an electrode for a cyclic voltammetry experiment. Ting and Jie Wen, two high school seniors and former American Chemical Society (ACS) Project SEED students, are carrying on an animated discussion about their science fair project on cross-linked enzyme crystals at the lab bench across from Gabe. Off to their right, graduate student Rachna, is seated at a desk epoxying new working electrodes for an experiment on conducting polymers. This scene is likely not what you might expect to see at a graduate research university. Nonetheless, it is the norm in my laboratory located in the chemistry and chemical biology department at Northeastern University, a private graduate research university located in Boston, MA.

I cannot address the issue of how I find time to work with undergraduates, without first addressing the equally important question of why, as a faculty member at a graduate research university, I do it. First, my students' enthusiasm for their work rejuvenates, buoys, and inspires me, my postdocs, and graduate students. Frankly, I believe that all of us are better teachers, mentors, and better human beings because of our interactions with the younger students who choose to partner with us. Furthermore, I believe that my group has been more productive because of the involvement of younger students in our efforts – in fact, 32% of the 38 technical papers published by my group over the past fourteen years have been coauthored by younger students.

So, how do I find time to work with undergraduates at my institution?   I have done it by identifying ways in which I can maximize student learning, satisfaction, and productivity and I have built these into the research experiences that I offer. Here are five concrete suggestions:

First, I make sure that each student has a real research problem. This is one in which both the student and mentor share a genuine interest and ownership. It is important to make sure that every student's problem is unique in some way and yet overlaps in some way with at least one other group member. For example, two students' projects might emphasize the same instrumental technique, protein or polymer.

Second, at the start of the project, my student and I draft a research learning contract (RLC). I recently described RLCs in an article published in the *CUR Quarterly*. In short, RLCs are written agreements ideally designed jointly by the faculty sponsor and student that define the format and nature of the project to be undertaken and which promote mutual inquiry and accountability between the faculty research mentor and the student.

Third, I save time by making sure that I spend adequate time mentoring my students. This sounds like an oxymoron but the more time you invest in mentoring your students, the more likely you are to see a return on that investment. So, I block time in my weekly work schedule to work with my undergraduates just as if I were teaching a class. If you do not set aside the time, do not expect to reap results.

Fourth, I strongly encourage the use of student authored protocols (SOPs) for instruction in new methods and instrumentation. As my research interests are constantly changing and evolving, there are always opportunities to author a new SOP or to amend an existing one. Students like SOPs because they represent tangible evidence of their research and technical writing accomplishments that they can share with potential employers.

Finally, and perhaps the most important rule I have discovered, is to have fun with my students. I do this in a variety of ways. First, by celebrating successes – it could be photographing a student's first successful distillation or their first poster at an ACS meeting. I also try to create informal opportunities for us to socialize together as a group. For example, in the summer on Friday afternoons after we share lunch together at some local eatery, we return to the laboratory and participate in some fun group activity that involves chemistry! Examples of activities including growing rock candy, making and eating ice cream prepared using liquid nitrogen as a coolant, or making hand lotion or hand soap. These projects often become the basis for course demonstrations or lab experiments or outreach activities with local middle or high school students.

Creating Time for Research at Marshall University

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Creating time for research is important, yet difficult. Creating large blocks of dedicated research time is nearly impossible. It is critical, therefore, that the institution encourages all levels to work in a coordinated effort to assist faculty in accessing those precious minutes and smaller blocks of time.

At the departmental level the Management and Marketing Division conducts a Research and Teaching (R&T) Forum six to eight times per academic year. The forum allows the division's 28 faculty members to brainstorm, find areas of similar interests, combine research efforts, and present a "test run" before submission to a journal or conference. This team approach saves a great deal of time for research in that two heads, or 28 as the case may be, are always better than one. Strengths and limitations of the presented material are discussed, other branches of potential research streams are noted, and personal "tips" are shared in the supportive atmosphere. Co-authored projects are encouraged among persons in the same discipline and across disciplines and sub-disciplines.

The R&T Forum began approximately 16 years ago in the Management Department and continued after the merger with the Marketing Department. The initial introduction was rocky as was the continuation following the merger. For the most part, faculty members did not see the value and, in all honesty, felt it was a waste of time. Persistence by the division head and a few persuasive faculty members, however, kept the forum going and, in time, it became a positive entity in the division. The R & T Forum is not only a place to share ideas, but also a place to share lunch. Pizza is donated by a local restaurant and faculty members bring their own soft drinks. In recent years, the other divisions within the college have adopted a similar format.

The Management and Marketing Division created additional time for research by eliminating meeting-only division meetings. Rather, the first 10 minutes of the 1 to 1 ½ hour R & T Forum is given to the division head to take care of administrative issues that cannot be handled via email. This approach was met with resistance early on as some senior faculty members wanted to continue doing things as they had always been done. However, the test of time won them over as they found it was a win-win situation. Time was freed up and administrative activities/communications were maintained.

Additional time is created for the Management and Marketing Division's faculty through the use of coordinators. Management, marketing, and management information systems, all with separate sub-areas (e.g. health care management, industrial relations), each have an area coordinator. These three individuals assist the division head with scheduling, discipline-specific administrative responsibilities, and chairing or coordinating search committees when positions are vacated. These positions are strictly voluntary, therefore, research support is provided or summer teaching assigned whenever the budget allows. Here again, the introduction was rocky. People were unaccustomed to a mid-level slot within the division. However, this, too, has proven to be a positive addition.

At the college level, the Lewis College of Business uses a centralized advising system. This format not only provides research time for the faculty members, but also reduces errors and time delays for the students. Students still seek faculty advice for career questions and class/program of study opinions, but all scheduling, applications for graduation, overloads, and add/drops are handled by the advising staff. Like the examples discussed earlier, this change was not welcomed with open arms. Many faculty members were opposed to the idea for two primary reasons. First, it simply was different. Whoever heard of faculty members not handling the advising? Second, it took the control out of the faculty's hands. Now, however, faculty members cannot imagine going back to the old system.

Other methods used at the college level to assist the faculty in creating time for research include scheduling classes using a two-day or three-day system, providing graduate assistants to each division, and encouraging application for research release time. Each of the above is supported by the university and encouraged.

At the university level, Marshall University offers a number of programs and services to support the faculty. For example, the Service Learning Program offers assistance to faculty members who desire to incorporate a service learning component in their classes. Many times, these projects include a student research element enabling faculty members to dovetail teaching and research time commitments. As another example, The Center for Teaching Excellence provides workshops and resources to assist faculty members in becoming better learning facilitators. The center serves as a clearinghouse and a support group for learning how to juggle research, teaching, and service. As a final example, the university supports a competitive summer research grant program.

Seek Win-Win-Win: A Habit of Highly Effective Professors

Mark Mitchell, Associate Professor of Marketing and Director, Center for Economic and Community Development, University of South Carolina Spartanburg, Spartanburg, South Carolina

In the best-selling book "The Seven Habits of Highly Effective People," author Stephen Covey encourages us to "seek win-win relationships" in order to maximize our individual and group effectiveness. Parties are encouraged to identify opportunities to create mutually beneficial outcomes. Covey further suggests we "put first things first" and prioritize our time and resources around those outcomes important to us. And, we're encouraged to "begin with an end in mind" and work toward that destination. Such an approach to our work will "create a synergy" whereby the collective outcome of our work exceeds the sum of the individual parts.

I want to "be proactive" in my approach to faculty life. I want to provide my students with a meaningful educational experience. As such, it is imperative that I maintain contact with business practitioners. Doing so helps me to "sharpen the saw" and keep my content, methods, and examples relevant for my student audience. And, this helps me to "understand … then be understood." The reader will likely recognize all "Seven Habits of Highly Effective People."

I want to be both an effective and efficient faculty member. I wish to identify opportunities to synthesize my roles as teacher, researcher, and service provider (i.e., the proverbial three-legged stool of academia). The three-legged stool can support lots of weight provided it is distributed properly. Take away any leg and the stool collapses. The same can be said for faculty life. A decline in research effort can lead to less up-to-date curricula while limited service work robs the community of our intellectual capital. This is particularly relevant at state-supported institutions with public service obligations.

As a faculty member at a teaching-oriented state university, I have successfully integrated student-driven research projects into my classes. I work with a variety of organizations drawn from my marketplace (e.g., governmental, for-profit, and not-for-profit). My role is to define a research effort that can be done by students within the confines of a single semester. Some recent partners include: the local chapter of the Boy Scouts of America, the managing board of a regional fair, the management of a local shopping center, convention and visitor's bureau, and others. I know my research partners expect a report of our findings. But, I will also structure our work (which typically includes some sort of questionnaire construction and data collection) to provide publishing opportunities as a offshoot of our work.

I try to develop win-win-win relationships. (1) My research work helps keep me up-to-date in my field. This enhances my teaching work and (assumedly) the learning outcomes of my students. (2) My service work allows me to apply my discipline for the betterment of my local marketplace. (3) My research and service work enhance my ability to produce intellectual contributions. This is vitally important to AACSB-accredited business schools as the AACSB standards anticipate a faculty group producing a portfolio of intellectual contributions specific to their mission. Also, recently revised accreditation standards encourage business schools to embrace active learning while lessening the reliance on passive learning (i.e., lecture, test, lecture, test). Such research projects immerse students in the discipline and promote active learning. I define these outcomes as win-win-win …Covey amended!

Here are a couple examples of our work. We investigated the students' perceptions of our local marketplace and their likelihood of remaining in the area after graduation. This work was done as part of a community visioning process. We were able to publish the results in a regional journal of applied topics. We studied the consumer perceptions of a local fair, but purposefully collected evaluations of all fairs for comparison. Such a design allowed the publishing of the aggregated perceptions as well as a manuscript to provide a template for other scholars interested in replicating our work in other locations. Our replication of a national study for the local chapter of the Boy Scouts of America provided an opportunity to produce a template for other professors included in textbook ancillary materials.

Need more time for research? You've heard them before: (1) Be proactive. (2) Begin with an end in mind. (3) Put first things first. (4) Seek synergy. (5) Seek to understand, then be understood. (6) Sharpen the saw (i.e., yourself). (7) Seek win-win-win relationships. Commit to a full integration of your existing roles: teacher, researcher, and service provider. This operating philosophy will enhance your performance as well as that of your students, department, and institution. That's win-win-win!

Research is Inseparable from Informed Teaching: Undergraduate Research in Electrical Engineering at Lamar University

Harley R. Myler, Department of Electrical Engineering, Lamar University, Beaumont, Texas

The title of this vignette speaks to an old saw (research is inseparable from informed teaching) that many have heard in one form or another. In order to broach the operative issue, that of finding time for research in the busy schedules of faculty members at a teaching university, we feel that there is no separation between these activities. Of course, one might counter that this is not the issue, but rather, that the question asks what is the mechanism for conjoining the two within the same time space. In the electrical engineering department at Lamar University we have found that the most effective tools are collective awareness and collective mentoring. By collective we mean the joint efforts of the faculty members of the department and in our case the group (six members including chair) is small and that makes for an easier time of collaboration. Unfortunately, it also means that we are extraordinarily busy. Nevertheless, we do find time for awareness and mentoring because these activities are shared and that gives rise to an efficient parallel processing mode of operation. Since we subscribe to the maxim that research is inseparable from informed teaching, we couple our teaching activities to that of our research and along the way we find undergraduates interested in pursuing various extracurricular research activities that have been stimulated by activities in the teaching curriculum.

One of our best examples started two years ago in our electrical analysis course in the fall semester of 2002. The course is our approach to numerical analysis and includes the numerical methods and approaches most pertinent to electrical engineers. The course is taught first semester of the junior year and follows the calculus and differential equations sequence. After learning computer solutions to differential equations, one student elected to pursue nonlinear analysis of the so-called Chua circuit. Leon Chua developed the circuit and it uses a nonlinear negative resistance to produce chaotic dynamics. The student became so enthralled with the behavior of this circuit that he wrote a paper about it that won third place in an IEEE area student paper competition. The student was subsequently invited to present the paper at a regional conference. During his senior year, the student expanded his work to include a hardware model and an analysis that used the circuit for encryption. The student is now in a doctoral program in dynamical systems at Texas A&M.

After the faculty learned of this student's interests we facilitated the development of his project and encouraged him to submit a paper on it to the area competition. This is what we feel is the key – once a student has been identified and has begun to develop a research topic, it is essential that the faculty help to cultivate it. Often the student has no idea "where to go with it" and that is where the mentoring can make or break a good topic. Detection is key to this and our faculty members watch carefully for budding interests. After those interests are detected, we work collectively to cultivate them. This can be nothing more than getting the faculty together to provide an audience to review and critique a presentation. Some researchers tend to be compartmentalized and that does not work in our group. Each of us takes an active roll in the mentoring process, whether it be our area of expertise or not, because the success of our department is directly reflected in the success of our students.

Two Institution's Approaches to Creating Time for Research
Suzanne O'Handley, Department of Chemistry, Rochester Institute of Technology, Rochester, New York

I am a biochemist and assistant professor in the chemistry department at the Rochester Institute of Technology. Until recently, I was an assistant professor at the University of Richmond. Since I have been at two universities, I have observed a number of approaches for creating time for research; two major approaches have been reduced teaching loads and developing blocks of time.

While I was at Richmond, the teaching load was reduced from 9 contact hours each semester to a 9/6 load. What made this course reduction possible was that the dean initiated the reduced course load and hired a number of new faculty members. At RIT the course load is technically 12 contact hours each quarter for three quarters. In the chemistry department, our teaching loads are reduced by giving faculty members credit for working with undergraduate research students; we can receive up to 5 contact hours of credit per quarter, reducing our course load to almost half of the normal load. It would be impossible to do serious research if I had to teach the full load.

When I first started at Richmond, new faculty members did not receive a reduced course load as compared to the other faculty, whereas now they do. These junior faculty members can set up their research labs in half the time. RIT also gives new faculty members a reduced load and it really does make a difference. To achieve this, the senior faculty members have to be altruistic about helping new colleagues succeed. Richmond also gives a junior sabbatical, with no teaching for one semester, after a successful third year review. At RIT, faculty members have the option of buying out their time with grant money; however, this is often difficult to achieve with many of the grants that are more typical at PUIs.

The other major strategy for creating more time for research is creating or finding blocks of time. At Richmond, all of the chemistry and biochemistry lecture courses are taught in the morning and most of the laboratory courses are taught in the afternoon. Many of the introductory laboratories are taught by adjuncts or lab instructors, thus most faculty members teach one or two lecture courses in the mornings and one afternoon lab course. With seminar and the department meeting on Friday afternoon, that left three open-ended afternoons a week to focus on research. As a biochemist, it was more challenging for some of my research students to also have these open-ended afternoons, because their biology courses were not as deliberately arranged and could occur at anytime throughout the day. However, I trained my students to keep two open-ended afternoons free and they could usually arrange this. At RIT, the courses are also not so deliberately arranged and we can teach at any time throughout the day or evening. Sometimes creativity and flexibility are the only way to arrange time blocks. In my first quarter at RIT, my research student and I had classes all afternoon Monday through Thursday, so we did research from 6 pm until midnight twice a week and all day Friday. I found time to spend with my husband by staying home until noon each day; I had this option because he works out of the house and my teaching and department obligations started at noon. I have known colleagues who have done research on weekends if no other time blocks were available. It is much easier to find these time blocks on our own if we are able to work nights or weekends, but this is much more challenging for people with families. Thus the best way to develop time blocks is to create them in a deliberate way as a department or college.

The above strategies are helpful, but even with those advantages some people still do not find the time for research. When all is said and done, sometimes, it is attitude that is necessary to create time for research. My trick is to do the things I want to do (this includes research) before I do the things I have to do; the things I have to do always manage to get done regardless of when I do them. Ultimately, to create more time for research, it must be prioritized not only by individuals, but also by departments and universities. Only then will strategies like those above be implemented.

Creating Time for Research
Elizabeth Papish, Department of Chemistry, Salisbury University, Salisbury, Maryland

I am currently in my first year of a tenure track position in the chemistry department of Salisbury University (SU). Our teaching load is on the heavy side since we usually have 12-15 contact hours a week, yet I have found that making time for research is both possible and highly rewarding. In addition to the preparing to teach courses for the first time, I have an hour commute each way since my husband's job as a meteorologist is 120 miles away from SU and we live halfway in between.

Professors at SU are required to post their schedule including lectures, labs, office hours and research time. I was at first wary of this since I feared my students would use the schedule to track me down and ask questions during my other classes or my research time. In actuality, this was an excellent way to set aside time for research. I found that both students and faculty respected the importance of my research time. I also think it is important to encourage students to not procrastinate seeking help until the last minute.

My first semester, I began prioritizing and setting goals for my research. My modest goals were to apply for both external and internal grants, set up my lab and attract students to my research group for the spring semester. I put a lot of work into my application for the PRF start-up grant, devoting a few Thursdays and several Sundays to editing, rewriting and searching for relevant literature. I also ordered chemicals and research equipment, including a glove box and a solvent purification system since my research involves air sensitive organometallic chemistry. By the end of the semester, I had set up my lab and I had one student signed up for research in the spring.

You are probably wondering how I managed to do a conscientious job teaching while devoting so much time to research. I did a significant amount of preparative work over the summer, and I had lectures for the first six chapters done on day one. I found that there was little time left during the week for grading, so most of my grading was done on Saturdays. Anticipating this fact, all my quizzes and exams were given on Fridays and promptly returned by Monday. I also need to multitask quite a bit. I often read or grade while I use the treadmill. I record my lectures, both live and when I rehearse, so I can listen to them during my commute. It helps me prepare while use my commuting time efficiently, and I believe it has helped me speak more clearly.

Winter break allowed me to focus on my research; I began some experiments and ordered forgotten items just in time for my research student, Mike, to start work in the lab. A second student, Nonye, joined my research group during the first week of spring classes, and luckily her hours mostly overlapped with Mike's. Still, I was skeptical about making time for over thirteen hours of research with students a week while teaching two lectures and three labs. My schedule has nearly every hour from 8 am to 6 pm booked solid. Four weeks into the semester I can say that it is working. I listen to the lectures I recorded last semester on the drive in, and I do most of my grading and class preparation on the weekend (often in one day). The time I have made for research is absolutely worth it. Mike and Nonye are full of enthusiasm and I enjoy working with them in the lab. Students from my classes sometimes come by my lab to ask questions and I can tell they respect my interest in research. Many of them want to know more about what I am working on and they seem interested in doing research too sometime soon.

A Curricular Framework Creates Time for Research

Wade H. Powell, Biology Department
James S. Keller, Chemistry Department
Kenyon College, Gambier, Ohio

Science faculty members at Kenyon College enact the philosophy that students learn science by doing science. From the earliest days of their first year, students routinely design experiments through guided inquiry, work with research-grade instrumentation, and interpret their results within the context of primary literature. Our "research model" curriculum employs a highly personal approach that centers on close and frequent interactions between students and faculty. Examples of this pedagogical approach span the entire curriculum, from discovery-based introductory labs with significant independent projects to the publication of collaborative research with faculty. Student-faculty research forms the core of our science culture. In a very real sense, we create time for our research by doing research as a part of the instructional curriculum, with constant student involvement.

A research centered curricular and cultural framework offers clear advantages for both students and faculty. Students involved in discovery-based labs are better trained and motivated to participate in independent endeavors with faculty members. Incoming (and even prospective) students observe numerous role models who demonstrate the advantages of undergraduate research. Lab classes can serve as the incubator for faculty research projects, and pilot experiments initiated in teaching labs frequently blossom into productive, long-term research avenues. Students who are routinely exposed to research are better prepared to excel in any research environment. Our candidates for graduate schools are motivated and informed, and they enjoy substantial success in the admissions process.

While a research model science curriculum offers strong advantages for student and faculty research activities, this pedagogy requires a major investment of faculty time and effort. Time costs stem only partially from the preparation time required to plan, troubleshoot, and execute inquiry-based lab and discussion courses. A culture of research also induces more students to spend time within the science departments—in the research labs, in the hallways, and in the faculty offices. We have recently observed increases in the number of students engaged in research, the time they spend doing experiments, and their level of commitment. Ironically, the research culture we strive to create increases demand for faculty effort and can actually decrease the time available for faculty to devote to the operation of a genuinely productive research lab. How, then, can we create time for research in the midst of a research culture?

At Kenyon College, we award teaching credit to faculty members who mentor research students, recognizing the central contribution of active research laboratories to our instructional activities. Students receive academic credit for the experiments they conduct in faculty lab groups by enrolling in each department's research course. Every semester, this course is an equal part of one faculty member's ordinary teaching load; it does not require an overload of contact hours. Neither does it represent a release from a teaching responsibility. In addition to actively mentoring her own research students, the course instructor has important responsibilities for fostering the department's overall research culture and upholding the standard of quality of student work. These responsibilities include:

- **Organization of the course**. The instructor prepares a course syllabus defining clear expectations for the student researchers. Permission to register is granted when a student has identified a mentor and prepared a written agreement about a project's goals and the expected time commitment.
- **Monitoring/evaluating student progress**. Each week, students complete a web-based form describing research accomplishments, time devoted to the project, citations of relevant papers read, seminars attended, and goals for the upcoming week. Copies are automatically e-mailed to both the instructor and the student's mentor. The instructor reviews these reports regularly and uses them in assigning grades at the semester's end.
- **Student gatherings/presentations**. The instructor sets the schedule of research student gatherings. Students present their work with posters, slides, or informal chalk talks. The instructor provides commentary and advice on the project as well as presentation skills.
- **Seminar series**. The instructor records seminar attendance and coordinates student interactions with outside seminar speakers. An important facet of a speaker's visit is the opportunity to meet with students enrolled in the research course.

This arrangement creates time and increases productivity for all faculty involved in research.

By centralizing the tasks of creating a research culture, we prevent lab-by-lab duplication of the activities itemized above. Well prepared students subjected to clear, uniform expectations work more effectively. Research quality improves with less waste of time and resources. This course enables faculty members to efficiently maintain the research culture while preserving time for everyone's research.

The aggregate duties of the research course instructor are central to the creation of a community of scientists. By formally defining these duties and centralizing their responsibility as a teaching activity, we insure the continuity and high expectations of the research culture. By rotating the responsibilities among all department faculty, we encourage ongoing research engagement. And by recognizing the creation of research culture as part of the teaching load, we affirm that teaching and research are essentially indivisible activities.

Finding Time to do Research: Increase Your Mind/work Force, Manage Your Time Carefully, and Organize Your Projects and Personnel to put Your Research Activities into High Productivity Gear

Jorge A. Santiago-Blay, National Museum of Natural History, Department of Paleobiology, Washington, DC

Some of us in the academic environment may become frustrated amidst multiple responsibilities (teaching, research, and service, as the case and emphasis may be) and ask “When am I going to find time to complete that paper I left unfinished ‘x’ time ago?” While there is no single solution, and in some cases it may be difficult to find any, here I emphasize fundamental strategies and philosophies that have helped me perform my responsibilities in a life-giving fashion, including staying credibly involved in research and fostering a mission I consider vital, namely undergraduate improvement and learning. This paper assumes that there is a good “fit” between the specific working situation one is in and the research goals one has set forth.

Increase your mind/work force: integrate your research with that of the undergraduates

It is difficult to conduct two completely independent research activities: your own and that of the undergraduates one oversees. Why not use an alternative model: integrate them and have the undergraduates be coauthors of papers. With a carefully selected (by you) and compatible additional mind/workforce you can be more productive using similar amounts of time. It is a “win-win” situation: we learn from each other, have a great infusion of the wonderfully healthy joy for life, and quality research happens faster as there are more minds and hands at work. I impress on students the significance of the work and the importance of integrity in research. I show students examples of previous work done and published in collaboration with previous undergraduates. Also, I have found that those outputs are fostered the most in egalitarian working atmospheres. As a consequence, most undergraduates become more motivated to complete their projects. At first, I provide the necessary guidance (this is your time investment) and, after a while, undergraduates become independent (this is your time saved). Although I regularly check their work for quality control (another time investment), there is greater productivity. For instance, I have experienced the joy of seeing previously SEM-naïve undergraduates tackle the microscope with confidence, after having received only 2-4 hours of instruction. A few hours later, they return with publication-quality images. And this happens time after time. Interestingly, I have also found that their overall attitude toward studies and their academic performance improves.

Manage your time

Time is a precious commodity that ought to be protected. Block out time on your schedule for your own independent research, including “think time”. Once people become aware of the boundaries you have set, they will be less likely to knock at your door during your times of individual productivity. In addition, when students are scheduled to do research, be there to support them and be sure undergraduates are growing towards critical thinking and independent work of the utmost quality. After all, in this model they are your colleagues in research and co-authors of papers.

Organize the projects and personnel: put the research activities unto high productivity gear

I incorporate student input within my research activities, allowing them to find a niche that they value. We coordinate work activities so that: 1) every person has a manageable piece of work with a concrete goal and 2) all members of our group help each other and learn from each other (a major time saver), a balanced mix of theoretical (*e.g.* evolutionary biology), concrete (*e.g.* data collection and analyses, writing, publication, and presentation of research, proposal writing), and practical skills (*e.g.* how to operate safely a variety of scientific instruments).

In sum, what has helped me the most in finding time to complete research has been executing a model that: 1) fully incorporates undergraduates, as equals, into my research; 2) manage my time carefully; and 3) organize our group's research activities in a goal directed fashion.

Creating time for research: Using a Student Organization to Drive Research
Lauren F. V. Scharff, Department of Psychology, Stephen F. Austin State University, Nocogdoches, Texas

Stephen F. Austin State University is a teaching university, so our typical loads are 4 courses per semester. Faculty and student research is valued, but must be squeezed into one's schedule on top of teaching and committee work. We do have independent research and thesis courses for which students can sign up with a faculty members' permission. However, these courses are "taught" (the research is supervised/directed) as course overloads. Thus, I have tried to be creative in ways to increase my ability to do my own research as well as supervise student research. I believe that the following approach could be modified to work well for a variety of student groups.

My approach developed a few years ago after I became faculty advisor for our branch of Psi Chi, the national honor society for Psychology. One of the missions of Psi Chi is to promote student research, and our branch had for many years formed one research group per year to complete an original research project. This project would be presented during a Psi Chi session at the Southwestern Psychological Association Convention.

After I became faculty advisor for the group, I encouraged the students to form several research groups (sized 3-5 members) rather than one large group (up to 10 members). This worked well for several reasons. It was much easier for groups to coordinate meetings with their smaller sizes, and there was variety in the topics of research. (We all realize that it's much easier to get students involved in extra projects if the topic appeals to them.) Presenting their work at a regional conference was a big motivator. Thus, we now have 4-7 research groups per year with 20-35 students involved rather than just 5-10 students. I have typically supervised 4-5 groups myself, and other faculty supervise additional projects.

Although I do not choose students for each group, I have tried to ensure that each group has at least one upperclassman who will have completed the statistics and experimental methods courses in our department. Typically, during the design portion of the projects, I meet with each group once a week. I supervise the process of obtaining IRB approval, data analysis once the data have been collected, and give feedback on the abstract to be submitted and the full paper that is written. Throughout the whole process I rely on email to stay up-to-date with the groups' progress.

Recently, I have gone one step further with respect to group membership. I have arranged for each of my research groups to include one of our masters-level students. These students join Psi Chi as graduate students if they were not already members from their undergraduate years. They help keep the group organized and on track, and decrease the number of times I must personally meet with each group. In many cases the graduate students also help the group collect their data and prepare the results for analysis. In addition to significantly easing my load, the students benefit from this new arrangement. The graduate students further develop their own research skills, develop leadership abilities, are able to attend an additional conference, and are able to list an additional presentation on their vitas. The undergraduate students get to work with a graduate student role model, which is beneficial because most of them desire to go on to graduate school themselves.

This general approach could be used with similar groups in other departments and universities. I believe that it helps to target a student organization for participation in the research groups because it can become part of that organization's identity and mission. Thus, over the years, you can draw on the experience of students who participated the previous year, and there is steady participation without the need for the faculty member to "round up" students to work together. Even if your department does not have a graduate program, you may be able to bring in senior-level students to serve in a role comparable to that of my graduate students. I also want to stress that a conference presentation is a wonderful opportunity for students and serves as a great motivator.

Creating Time for Research

Sharon Faith Schoen, Education Department, La Salle University, Philadelphia, Pennsylvania

For the past 19 years, I have been integrating some form of undergraduate research into the teacher training program at La Salle University in Philadelphia, Pennsylvania. Convinced that scholarly productivity should be an outcome of education programs in general and special education, I have created a culture of professional socialization for my students. This socialization takes the form of curricular experiences and *in vivo* applications. I expose students to various forms of research (i.e., qualitative and quantitative) in their senior seminar course taken concomitantly with the student teaching experience. At this preliminary level, basic skills enable students to become critical consumers of research. We read, identify, and analyze articles representing diverse forms of research methodology. In order to develop the capacity to become research-practitioners, students are then taught to design, implement, and analyze the effects of action research projects. Over the course of the semester, students are guided through the steps of identifying a problem in their student teaching placement, conducting a review of the related literature, determining multiple forms of on-going data collection, implementing four intervention strategies representing a myriad of theoretical approaches, analyzing data on a weekly basis, reporting the findings in a written report as well as class presentations.

This final dissemination step has become the vehicle for promoting various levels of extended scholarly activity. Differential quality of effort warrants differential levels of encouragement. Some students' work has been recommended for presentations at state and international conferences. Many written reports have provided the basis for collaborative publications in refereed journals and data bases. Invitations to extend their learning are offered on a voluntary basis. The predominately affirmative student response does require additional, but reasonable allocations of instructor time after the semester. Nevertheless, the bulk of the skills have been cultivated through coursework at the university and applied through action research in the schools. To date, ten coauthored undergraduate student research articles have been published through refereed outlets with one more currently being reviewed for publication and two more in the preparation stages of submission.

The intended outcome of perpetuating respect for and interest in the role of research in the classroom can only be promoted by systematic exposure and planned experiences in real contexts. Such endeavors elevate the status of educational research in teacher education programs and infuse the researcher-practitioner role onto professional expectations. Action research, in particular, is founded on a commitment to improving the quality of life of others through critical reflection and inquiry. This occurs as teacher candidates gather information about and reflect on their students' needs, abilities, and learning styles to enhance instructional outcomes. Assessing, exploring, researching, discussing, documenting, evaluating, monitoring, analyzing, refining, revising, and disseminating become recursive actions. Ideally, students will embrace the position that dissemination of findings is a professional responsibility that informs future practice.

Independent Study – One Way of Creating Research Opportunities

Vijayakumar Shanmugasundaram, Math and Computer Science Department, Concordia College, Moorhead, Minnesota

Independent study is one way of finding the time and the opportunity to do research. The advantage of independent study is that you do not need any grant to do the research. As long as students are interested and if you are only willing to help and guide them, independent study is one way of creating research opportunities.

This article will not be complete without a reference to my mentors who have inspired me to do research in any possible way. In graduate school, I was introduced to expansive soils through independent study, which later become the main topic of my Master Thesis in Civil Engineering under the guidance of Dr. Dinesh Katti at North Dakota State University. This thesis led to one journal paper and a conference paper. I had the opportunity of observing him closely. He was always looking for opportunities for motivating his students to do research and for grant money to support it. For an example, he had taken a real world problem and made it as a capstone project for seniors in civil engineering. This led to a publication with no money involved.

Later when I was doing my Maters in Computer Science under the guidance of Dr. Paul Juell at North Dakota State University, I picked up lot of tips from him about finding time to do research and doing it without any grant. He had lot of graduate students doing thesis under him. He used to guide them all in doing research and get some publications without any grant. He used to tell me that if you want do research in a particular area, you should not go for big things which may need more time, effort, and money. He used to suggest that you should pick up small nuggets and go after them with available resources by way of either independent study or as thesis. For example, we could get at least two papers without any grant and extra effort – one through an independent study and another through thesis.

When I started working for Concordia College as an instructor, I could not do much in research, as I was busy settling down with the job. But in the second semester, when three students approached me for learning object oriented programming (Java) through independent study, I saw the opportunity for doing some research even though there was some reluctance on my part as I do not get paid for independent studies. But because of the inspiration of my mentors, I agreed to teach them Java with one condition that the students should agree to do some research as part of the course work. The research was very simple in the sense that they should create visualization for any particular concept that they find hard to understand as a final project. The 'small nugget' was that I felt that students would learn better if they were asked to learn object oriented programming by creating visualizations. I taught them both object oriented programming and the principles of visualizations simultaneously. I could easily motivate my students to do research in their course work by telling them that tomorrow some students would be using their visualizations to learn object oriented programming. This independent study resulted in a conference paper and paved the way for getting a Centennial Classroom research grant from Concordia College to do research further in this area. It should be noted that the students in Concordia and North Dakota State University now use these visualizations for learning object-oriented programming. I am happy that I am successfully following the footsteps of my mentors. One of these days I will somehow find time to get a NSF grant with the help of my undergraduate students who continue to take independent study with me.

Developing and Implementing a Two-Course Sequence in Research Methods/Statistics

Kathy Silgailis, Department of Exercise and Movement Sciences, William Paterson University, Wayne, New Jersey

Imagine that your faculty were charged with the goal of increasing the number of undergraduate students involved in research. Members of the Strategic Initiatives Committee of the College of Science and Health (CSH) were charged with this enormous task in 1998. The nine committee members were familiar with the pervasive attitude that there are major time constraints related to conducting research on the part of both faculty members and students. After all, faculty members do not have the time to supervise undergraduate research projects and students definitely do not have time in their busy class/work schedules to collect, analyze, and interpret data. After much discussion and investigation of models of undergraduate research, the committee decided on the goal of providing a research experience through a two-course sequence in research methods/statistics. Faculty members would therefore, be able to supervise research projects as part of their teaching loads and students would be able to complete a research project across two semesters of coursework.

A major challenge was encountered soon after the committee agreed upon the structure of the research experience. Similar to the “lack of time” attitude discussed earlier, committee members were concerned about devoting a large amount of time to this important project without adequate support. One committee member suggested submitting a grant proposal to support the development and implementation of the two-course sequence in research methods/statistics. After two attempts, we were awarded a 3-year grant funded by the National Science Foundation (NSF) Course, Curriculum, and Laboratory Improvement (CCLI): Adaptation and Implementation (A & I) track in 2002.

Developing the two research methods/statistics courses for sophomore students in Biology, Chemistry, Computer Science, Environmental Science, Exercise & Movement Sciences, Mathematics, and Nursing was the next challenge. Our goal was to develop courses that were investigative, collaborative, and engaged students in gathering and interpreting data. After examining “active-learning” models in place at several institutions (i.e. University of Delaware), the preliminary course outlines were developed in the summer of 2002 and presented to CSH faculty during individual department meetings in September 2002. Feedback was solicited and used to finalize the course outlines. The two courses, Integrated Research Methods/Statistics I (CSH 250) and Integrated Research Methods/Statistics II (CSH 350), were approved as official courses in November 2002.

Course 1 (CSH 250) involves developing a research question and corresponding hypothesis for a research project. Writing the introduction and review of literature sections and basic statistical procedures are also included in this course. The statistics covered include frequency and sampling distributions, measures of central tendency and variability, hypothesis testing, Chi-square test, and Pearson correlation. Course 2

(CSH 350) involves refining the research question and designing appropriate methods to collect data. Writing the method, results, and discussion sections and additional statistical procedures (multiple regression, t-test, and ANOVA) are also covered in this course. Students complete the group research projects started in CSH 250. There are several unique features to the two-course sequence including: (a) students work in interdisciplinary research groups across two semesters; (b) active learning exercises are completed to reinforce research/statistics concepts; (c) labs are conducted to collect data for use in the statistics computer exercises, (d) students learn how to conduct statistical procedures using Excel and/or SPSS; and (e) each course is team-taught by two professors, one from a Science or Health department and the second from Mathematics.

Throughout the fall semester of 2002, the grant team met with individual departments in the CSH to discuss issues related to the two-course sequence. Specific issues included content of the courses, credit allocation within the majors, course scheduling, and faculty teaching assignments. Academic advisors were strongly encouraged to recruit students to enroll in CSH 250 in the spring semester of 2003. The first cohort of students completed the two-course sequence in the fall semester of 2003. One research group examined the relationship between number of days of hard and light exercise over the past two weeks, daily hours of television viewing and playing video games, and percent body fat for students in grades 4-8. The undergraduate students collected skinfold measurements from 54 boys and 53 girls at two local public schools. At the end of the semester, the group orally presented the results of their research project. These students remarked that even though the project was very time consuming, it was time well spent. And they actually learned something about statistics, specifically p-values!

In conclusion, our attempt to increase the number of undergraduate students conducting research is just beginning to evolve. It is anticipated that upon completion of the two-course sequence, students will have developed the skills and knowledge necessary to engage in independent studies, research projects with faculty members, and summer research projects.

On Creating a Preparatory Seminar for the Undergraduate Senior Thesis
Kevin Simpson, Social Science Department, Concordia University-Portland, Portland, Oregon

Faculty scholarship that affords undergraduate students the opportunity for direct, collaborative involvement in the research process is a uniquely exciting prospect for many teaching faculty in small, liberal arts colleges. In an effort to make this involvement more formal and intentional, we have created a one credit-hour interdisciplinary thesis practicum course that is part of a sequence of courses that culminate in the undergraduate senior thesis, an independent research project completed by students in the arts and sciences at our institution. Three-to-four years ago, we realized that our students were struggling to meet the newly-revised demands of the thesis requirement for our graduate school emphasis track in psychology and biology. With increased academic rigor came a corresponding need to provide our budding researchers with a structure that could allow them to augment and build on the concepts they were learning in their research methods courses. We also realized that our research-active faculty members were becoming increasingly distanced from the mentoring role with these students by virtue of the fact our enrollments in the psychology and biology majors were growing rapidly during the same time period.

Since much of the preparatory seminar was devoted to direct faculty-student contact, we set out to design a course that would avoid redundancies to previous research-related coursework. This was easily accomplished since the seminar was team-taught by the same three faculty members who are responsible for teaching the research core in experimental psychology, statistics and laboratory biology on our campus. The guiding assumption in the seminar was found in our attempt to teach the process of research. At once, involved faculty members are able to have time set aside for discussion of their research ideas and experiences, while students concurrently grapple with formulating their own ideas into testable questions of empirical inquiry. We have also found that the faculty, as mentors and collaborators, are better able to reveal their own anecdotal successes and challenges conducting research, both past and present.

The distinctiveness of the thesis practicum course lies in the planned mentoring that occurs in and out of class. Students spend most of their energy in the development of their thesis statements. They generate hypotheses, operationally define their variables, and deepen their familiarity with the proposal aspects of research. While these are expected goals of any thesis project, we have found that a semester lead-time in the development of the thesis statement has been invaluable once students actually run their studies. Prior to this practicum, our students would consistently languish with idea formation, for weeks on end, often leaving them demoralized to begin actual data collection. As we are in our third year of teaching this upper-division preparatory course, there is a noticeable change in the time and quality of effort given to the final thesis project, which we directly attribute to the creation of the practicum.

Specific content of the course has also evolved in the last few years. In addition to requiring students to meet at least twice outside of class with their faculty thesis advisor, we ask the class to attend an annual regional undergraduate research conference where they can witness firsthand the culmination of the research process. Typically, there are at least two former thesis practicum students who present at this conference, which provides another excellent example of peer-learning. This peer-mentoring piece has naturally emerged in the course itself as students regularly have the chance to present, critique, and revise their work within notably small groups (instructor-to-student ratio is 3:1). Toward the end of each term, we ask recent graduates to present synoptic summaries of their theses during class time. Specific skills and content areas that are advanced include research report writing using APA style, the human subjects review process, qualitative considerations in research, and limitations and biases in empirical inquiry. Further, students were presented with practical guidelines how to make their ideas clear, how to receive criticism of their work, and managing pragmatic concerns in the oral defense of their theses.

As this senior thesis preparatory seminar was an institution-wide initiative, several barriers were realized, most of them financial in nature. Because each faculty member received only a one-third teaching load for the course, the net cost to our college was minimal and no course re-assignment or release time was needed. The didactic demands were also slight because of the shared teaching responsibilities and our emphasis on process over content. Faculty and student course evaluations have been consistent in their praise for experiences contained within the senior thesis preparatory seminar. If this is a course idea you would like to implement in your research curriculum, a syllabus can be made available by contacting the author.

Time Management for Undergraduate Researchers at the University of Tennessee at Chattanooga

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Finding time for research and associated activities is a constant task for me. Like most of you, my teaching duties are principally dedicated to undergraduate students. In a typical semester I teach two upper-level courses, one of which includes a laboratory section. I also direct from one to five independent research projects by undergraduate students each semester. Usually, at least one of these projects is an Honors project. On top of my undergraduate work, I also teach one graduate course per year, and direct from one to four graduate projects. Needless to say, I must budget my time carefully to get everything done. I would like to highlight some of the things I do to serve my students year after year.

First, I try to establish a good, efficient process of inquiry in my undergraduate students before we step into the laboratory. To start, I try to have all prospective student researchers take a one credit independent study of primary literature related to my research. Over the course of a semester we read and discuss between 12 and 15 articles. These discussions culminate in a written review paper discussing the literature and setting forth a hypothesis or two to guide the student's research. Usually, the research commences the next semester, although if the student is an Honors student, I recommend that they start their laboratory research in the summer. The laboratory portion of the project is usually three credit hours worth. The student is then responsible for writing up a full laboratory report that often serves as a first draft for a manuscript for submission to a journal. One of the final requirements I have for my students is that they also submit an abstract of their work for a presentation at a scientific meeting. Usually, I have three or four such presentations occurring each year.

Finding time to do all of this is my job. My students all have weekly times for individual interaction with me worked into their schedules. When it's time for sample collection trips and experimental set-up, I try to schedule these for the same weeks, especially for multiple student projects. To make this work well, it's advisable to have some common theme linking the various projects together. This way, one sample collection trip can serve to provide samples for four or five students. Also, much of the set-up can be done in a communal manner, where general descriptive data is generated by all of the students and me for use by all. Then, each student initiates their incubations or other procedures. Each student is then responsible for following through on subsequent samplings, extractions or other processes that periodically occur. During this time I am "on call" to handle any problems that come up, or to answer questions. Lastly, I will help the students organize their data into spreadsheets and give instructions as to specific analyses to perform. The students are then on their own until they produce a rough draft of their reports. For Honors students we often have a second round of experiments to set up. Usually, this occurs during the break between fall and spring semesters.

The final area of concern I have for hosting undergraduate student research projects is funding. Due to the nature of my research as a biogeochemist/bioremediator, unique reagents, gases, or equipment maintenance for a typical semester-long research project may cost from $1,000 to $3,000 per student. Knowing about various funding options helps save valuable time up front, before initiation of any project. Since I also work with graduate students and often have research grants that focus on their work, I usually have some funds that can be used to support the undergraduate projects related to those grants. Additionally, the UTC administration makes available various funding options for undergraduate research (e.g., Provost Student Research awards of up to $1,000). One particularly useful source of funding I have had available the past three years is a joint grant between UTC's Chemistry and UTC's Biological and Environmental Sciences departments. This grant from the Merck AAAS program has provided funding to support summer undergraduate interns to work on independent research projects. Of the three summer interns I have had, two of them worked on research related to their Honors projects. Beyond these sources of funding, I often have a small amount of discretionary funding related to overhead funds generated by my grants. As a last resort, I will attempt to obtain funding from the head of my department, or the dean of my college. The rewards related to such funding are often great, however, frequently providing the preliminary research necessary to obtain subsequent extramural grants. All in all, I feel that my time spent working with undergraduate researchers is well worth it!

Creating Time for Research

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I decided to share how I created time to build a solid research program in spite of the full teaching load and lack of major instrumentation. I am quite successful in terms of grants, publication and international recognition and of course, in terms of promotion and tenure. Most of all, I am grateful that I could give a rewarding experience for undergraduates through my research and motivate them.

One of the foremost criteria for research is that one really wants to do it - just for the excitement it brings to try to tap into nature's amazing and elegant secrets. If it is done with tenure as an end in view, it becomes a real stress builder.

If one really wants to do it, then one will create time for research. Where there is a will, there is a way! Even though, I am making it sound too easy, believe me, I know it is not. Many a time I have gone through so much frustration, for I need to wait for the results to find out whether I did achieve my goal. Depending on somebody's mercy, because of lack of facilities, takes away the excitement and the love for your research.

But, still, your love for research is so intense you try to swim and start putting in time, by traveling weekends, using an instrument during your dinner time, spending most of your summer inside the laboratory, putting in twelve hours a day, doing just the basic chores for survival etc. I did not have a choice, but to create time in the above manner, especially with a heavy load of teaching. The administration is never willing to give you time off to do research even though it is one of the criteria for your tenure. I enjoyed doing research so much; I was willing to forgo a lot of things. I forgot that I have a personal life and for me doing research is both relaxation and entertainment. I know that many may not be willing to, or even if they are willing to, cannot afford to have the kind of life style I had/have.

I am grateful to Penn State, our administrators for partially (70%) supporting most of my travel.

Now, I am a full professor and I am still doing research. The head of the division commented on my traveling to accomplish whatever I needed as something that does not become my position, and suggested that maybe I should start taking some leadership role. Maybe he is correct, but my love to explore is so overpowering that I do not mind it.

The Lynchburg College Faculty Scholar Leave Program
Elza C. Tiner, School of Humanities and Social Sciences, Lynchburg College, Lynchburg, Virginia

Lynchburg College has an excellent program that allows faculty members to devote a semester of concentrated time on research. In the fall of each year, proposals are requested for projects; the college Faculty Development Committee votes and selects one for a semester of concentrated research time, without teaching. I had the privilege of participating in this program during the fall of 2003, to work on *Devotion and Emotional Appeal in the York Plays*, plus two other books in progress, *Writing with Grammar*, in collaboration with Goldie Ann Dooley, M.Ed. '02, a former student, now a graduate student in linguistics at George Mason University; and an edited collection of articles, *Teaching with the Records of Early English Drama*, in progress. Since I am a multi-track researcher, this leave program allowed me to work in my favorite style, rotating among projects.

The first book is an extension of research completed for my doctoral dissertation on rhetoric in the medieval *York Plays*. In the continuation, I explored the use of emotional appeal in the plays, first by researching sources for the concept of emotion and its relation to acting. I found a link in Ciceronian rhetoric and in medieval devotional manuals. The results of this work will be presented in a paper, "Method Acting in Medieval York" at the upcoming conference on medieval studies at Kalamazoo, MI, in 2004.

The idea for the second project began in my Advanced Grammar and Linguistics course in 2001, when Goldie Ann Dooley was a graduate student in our M.Ed. in English Education. At the time, I was working on the problem of how to get students to change their language habits, to use desired forms, i.e., what is called "correct grammar" in any given linguistic situation. The ability to teach language change is the key to incorporating grammar into writing. In her journal for the course, Goldie suggested that grammar textbooks needed more exercises in writing, to get the students to apply the concepts. Together we planned a project initiated by a Student-Faculty Collaborative Research Grant at Lynchburg College in the summer of 2001 (another excellent research initiative here), prepared a textbook plan, wrote a joint collaborative agreement to complete the work, and started to draft the chapters to show students how to incorporate new grammatical structures into their writing. The collaboration continues by correspondence, with Goldie drawing on her studies of linguistics at George Mason University for her sections of the textbook.

The third book, a collection of articles on pedagogy using primary sources from the Records of Early English Drama project, University of Toronto, is in the editing stage. This book shows how primary researchers in Early English drama use their documents in the classroom, in several disciplines. The book was submitted to the University of Toronto press in 2002. The readers' comments came back at a perfect time: during my 2003 Faculty Scholar Leave, so I had time to check the references, attend to the copyediting, and send the articles to the authors for their revisions. The book is now in the final editing stages, for Studies in Early English Drama, University of Toronto Press.

During the period on leave, I kept wondering if I was getting enough done. Sometimes it is hard to judge one's progress while working alone, without reference points for comparison. I often felt like Alice in Wonderland, on her way to the chess game with the Red Queen, who urges Alice to go "Faster! Faster!" but not seeming to move forward at all. Now in retrospect, I realize that the Faculty Scholar Leave program enabled me to cover a great deal of scholarly ground. Thank you Lynchburg College!

Turning Goals into Habits: One Junior Faculty Member's Effort to Make Time for Research

Nicole Willey, Department of English, Kent State University – Tuscarawas, New Philadelphia, Ohio

I became an assistant professor of English last August at a regional campus of a research university in Ohio. I thought, foolishly, that my responsibilities here would be far easier to juggle than the ones I was leaving behind: writing my dissertation, teaching as an assistant at my university, and scraping the rest of needed money for living together through adjunct teaching and tutoring. Surely I would be able to continue writing papers for conferences and publication with my new assignment.

In last semester's haze of paper stacks, benefits decisions, and settling into a new home, how could I even begin to think about research? Well, of course I did not, for awhile. But with a first-year reappointment file due in early December, I knew I had to make a case for my scholarship of teaching and discovery, and so I began to plan. Now in my second semester, I am proud to say that I have two articles in the pipeline, a conference presentation ready to go next month, and the notes for two encyclopedia entries in a folder on my desk. There is no magic formula for finding the time for research, but here are some of my goals (and hopefully my eventual habits) for staying sane while pleasing a variety of criteria:

Take care of yourself first. Last semester, I was not taking time to exercise, eat balanced meals, or even get regular sleep. The work I did, obsessively, was less productive because I was tired and sluggish. Whatever you need to do to feel good, do it. For me that means taking care of myself physically, and emotionally, through having a support network—being in touch with family and friends, and taking time for my husband. Keep a Sabbath. We all know that the weekend, two days to do nothing work-related, is impossible in academia. Know your limits, and promise yourself a Sabbath – some finite and regular period of time every week when you will not feel guilty about doing nothing at all work-related.

Divide and Conquer. We all know how hard it is to look at a class set of papers. Multiply that stack by three or four, and you have a headache before you even begin. Turn the huge stack into smaller stacks of five papers each. When you are fresh, it is possible to grade five papers in an hour, especially if you have a clearly defined rubric. Deal with your mail only once. Upon getting your mail, look at each piece. If it is junk, recycle it. If you must take action, do it, or write a "to-do" note and file the paper as needed. When checking email, respond to each piece immediately, and then delete or file.

Listen to your Muse. It's hard to do research, to write, to revise. So when you feel like it, do it. When you wake up with a first sentence or a last sentence, get thee to the computer, immediately. Do not worry about the stack of student papers; when you're feeling the words bubble out, take advantage.

Reuse and Recycle. We do not always have a muse, but most of us have a body of 200-300 pages of research and writing at our disposal, so make the most of it. I know that my dissertation will need a lot of work before putting it out there as a book, and books take years (often longer than the probationary period before tenure). So in the meantime, I am pulling small chunks, tangents, good ideas from the whole, re-working them, and sending them out into the world. I will not have time for new research until the summer. Knowing this, I am mining my own work and finding new ways to put it out there.

Be flexible. It is a Saturday morning, my Sabbath, and here I am writing an article in which I am giving advice that I often do not follow. But, I am listening to my muse. I woke up writing this article, so here I am. I know, however, that I will spend the rest of the day with my family. Those two encyclopedia articles are due in a month, and I cannot seem to start writing. For some reason, writing an essay about saving time feels more pressing, more important, more fun. I just have to trust that in the meantime, if I keep my stacks under control, if I keep myself healthy and sane, the muse will strike and I will get to work. If not, I will divide and conquer. If I cannot write, I will outline, and then I will be one step closer to being finished.