

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

A LEADERSHIP SUMMIT TO EFFECT CHANGE IN TEACHING AND LEARNING **Board on Agriculture and Natural Resources • Board on Life Sciences**

Poster Session

Tuesday, October 3, 2006

The poster session will be held in two locations:

- Gallery on the second floor above the lobby
- Foyer of the Great Hall, outside of the Lecture Room

Please be sure to visit the posters in each location.



Opportunities in Agriculture, Food, and Life Sciences

www.agforlife.com

Abstract

The agricultural industry is a dynamic and changing industry and in recent years has shown declines in student interest. The AgForLife™ concept is used to help educate the general public about the various opportunities related to, but not limited to, occupational and career opportunities in agriculture, food and life sciences. The AgForLife™ Map is an innovative process that will help in the recruiting process of students interested in the agriculture, food and life sciences. Many students consider pursuing an agriculture-related career to pertaining only to farm and ranch production. In an effort to reveal the many diverse opportunities represented by the food and fiber sector, the two-dimensional AgForLife™ Map aids in the visualization of different employment opportunities and careers. The Map also aids in understanding the integration of multiple systems for which materials and inputs flow through processes that provide elements necessary for an output to reach the consumer. It is through this comprehensive map that will better assist graduates with knowledge for multiple career paths and opportunities in the agriculture, food and fiber system. The AgForLife™ Map presents an opportunity to reach out to the general public at large, college students and high school students with the expectation of providing an educational perspective and awareness about agricultural industries and opportunities.

For more information about AgForLife™, please contact:

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Agriculture is Life: A Strategic Positioning Initiative at Texas A&M University

Authors: Elsa Murano, Karen Kubena*, Doug Slack, and Mark Weichold
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Abstract

The College of Agriculture and Life Sciences at Texas A&M University is being reinvented through a strategic positioning initiative. The purpose of the initiative is to change the image of the College and agriculture to one that reflects the breadth and depth of teaching and research that is being done today. Data collected through surveys of a number of target audiences indicated that the perception of “agriculture” by these groups is limiting our potential. The challenge for the future is to expand the concept that prospective students, employers, donors, and others have about the opportunities available through the College, and the idea that agriculture is life is one of the methods being investigated. With a better understanding of the perceptions of prospective students, high school counselors, high school science teachers, and others, we can design recruiting programs and market courses and curricula to attract students from diverse backgrounds more effectively.

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Agriculture at Wilmington College: Curriculum, Community, and Sustainability

Authors: Monte Anderson, Al Conklin, Neil Snarr, and Kathy Springsteen*
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Abstract

The Agriculture program at Wilmington College focuses effort on introducing students across the institution and community to trends in agriculture, particularly those related to internationalization of the curriculum and community involvement. We will introduce a number of our initiatives including a course on world foods, a general education course in global issues, a living crop museum, exhibits along a community bike path, use of intensive grazing on College farms, and introduction of riparian strips to ease stream destruction.

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A Model to Enhance the Transition of Students from a Two-year College to a Four-Year University: The Case of Landscape Horticulture

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Abstract

Strong linkages among two-year colleges and four-year universities are likely to foster the transition of more students into higher education and enhance student diversity. In one project, two New Mexico educational institutions—Doña Ana Branch Community College, a two-year community college, and New Mexico State University, a four-year university—offered a landscape construction class as a joint course offering for students at both institutions. The objective of this educational approach was to develop a system that facilitates the seamless integration of compatible curricula from a community college and a university. Course evaluations showed that 63% of students enrolled in the combined class rated the combining of a university and community college class as above average or excellent model of education. When asked to rate whether classroom materials and laboratory activities supported learning, 94% of the class rated those materials as excellent. Eighty eight percent of students rated the presentation of subject matter as above average or excellent when asked if the subject matter was presented interestingly. Students valued the experiential learning projects and would highly recommend the course to their peers. In this redesigned course, women and minorities constituted 63% of the class, suggesting that this educational approach has the potential to retain a large number of under represented groups in landscape horticulture. This educational model is now being applied to offer landscape irrigation classes via distance. We conclude that this collaborative approach for teaching landscape horticulture is likely to enhance horticulture education and foster a seamless educational experience for students who transition from a two-year college to a university. Also, this educational approach could serve as a model for curricula that combine practical knowledge with advances in science and technology.

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A Two Pronged Approach to Promote Food Science in U.S. High Schools

Author: Jennifer Cleveland McEntire*
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Abstract

The Institute of Food Technologists (IFT), the IFT Foundation, and Discovery Education partnered to create and distribute food science information to science department and school counselor chairs in all 18,000 US high schools. In January 2006, two multimedia “kits” were distributed to teachers and counselors. Each kit consisted of DVDs, food science technical or career information, and a call to action to visit a newly created web microsite containing career information and experiment ideas. To support and promote the program, IFT created its “Food Science Ambassador” program, which enables IFT member food scientists to volunteer to be a resource for teachers, parents and students. Through this program, IFT members have visited schools to discuss the field of food science or give demonstrations. Survey results from kit recipients were overwhelmingly positive, with over 97% of the respondents indicating that they intend to use the materials. The microsite developed for this program received over 18,000 unique visits in the first six months, and traffic to the IFT Teacher Resources webpage increased. In the first six months of its availability, almost 250 IFT members have signed up to be Food Science Ambassadors. Long term metrics for success are in place and continue to be monitored.

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Creating Real World Educational Opportunities through Student and Faculty Engagement

Authors: Rick Parker*, Esther Worker, Carey Kopay, and Shah Rahnema
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Abstract

Through national partnerships of colleges, universities, and industries AgrowKnowledge seeks to educate and prepare workforce-ready graduates to use emerging technologies for businesses and industries in agriculture, food, and natural resources. To accomplish its mission AgrowKnowledge uses internships, faculty development workshops, an annual conference, and a website with a resource clearinghouse. All of these focus on incorporating new technology, math and science in a hands-on agricultural context to engage faculty and students in new and emerging careers in agriculture. To build new partnerships that focus on seamless education and new technology other areas of the U.S. AgrowKnowledge conducts Planning Institutes.

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Cultivating Experiential Learning In Agronomy

Robert L. Rhykerd¹, Kerry W. Tudor¹, Bryon R. Wiegand¹, Douglas M. Kingman¹
and Douglas G. Morrish²

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Abstract

Increasingly, college students majoring in agriculture are coming from non-farm backgrounds. Yet a farm background is advantageous for many careers in agriculture. The Department of Agriculture at Illinois State University has designed and implemented a contest to provide students an opportunity to gain hand-on experience with crop production and marketing. The contest is based upon current pedagogical research supporting the theory that student comprehension is increased through critical thinking exercises and by applying course concepts to real-world situations. The contest was designed to enhance student learning by encouraging critical evaluation of classroom instruction and by requiring students to develop and implement crop production and marketing strategies on a real five-acre plot of land. The objective of this study was to determine if participation in the contest enhanced student knowledge of crop production and marketing. Competing in the contest were four teams representing student organizations that designed and implemented their own crop production and marketing strategies on a 5-acre plots with the goal of obtaining the highest profit margin from a corn-soybean rotation. Student knowledge was quantitatively evaluated by conducting a quasi-experiment using the pretest-posttest control group design. Significant differences in scores between groups were determined using an analysis of variance. Learning was also evaluated qualitatively through focus groups. Quantitative differences in scores comparing participants and non-participants were not significant. The contest tended to attract students with farm backgrounds and a greater prior knowledge of crop production and marketing. Qualitative analysis of the contest revealed that students perceived participation had a positive impact on their knowledge of agricultural practices, increased their self-confidence in dealing with farmers and producers, and improved their leadership skills.

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**Expanding Opportunities for Experiential Learning
Dale Bumpers College of Agricultural, Food and Life Sciences**

Authors: D. Graham*, R. Luttrell, C. Rom, and M. Warnock
University of Arkansas, Fayetteville

Abstract

The University of Arkansas has a stated mission of being a student-centered research institution serving Arkansas and the world. We have embraced this vision in the Dale Bumpers College of Agricultural, Food and Life Sciences and are aggressively pursuing opportunities to enhance experiential learning of our undergraduate students. Three primary components of the undergraduate program have proved successful in this endeavor: study abroad, undergraduate research, and internships. The maturing Global Studies Program offers a variety of opportunities to study abroad, conduct research and participate in internships that will lead to life-long partnerships, enhance cultural awareness and increase understanding of the global dimensions of the agricultural and life sciences. Students engage in undergraduate research projects in a one-on-one mentoring relationship, and results may be published in *Discovery*, our undergraduate research journal. Our long-standing internship programs are emphasized by many degree programs and offer important linkages with real world industries. We believe that experiential learning is an integral component of the total educational experience, especially at a public institution emphasizing student-centered research.

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Experiential Learning

Authors: Bailey Norwood, Doug Needham, Cindy Blackwell, and Paul Weckler
Oklahoma State University, Stillwater

Abstract

Aspects of the poster will include international experiences, industry involvement in experiential projects, capstone experiences across disciplines and experiential learning in the traditional classroom. The poster will include four examples, one each in these four areas: Agricultural Engineering, Horticulture and Landscape Architecture, Agricultural Communications, and Biosystems and Agricultural Engineering.

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Experiential Learning to Enhance Job Preparedness

Authors: Cindy Blackwell, Doug Needham*, Bailey Norwood*, and Paul Weckler
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Abstract

Oklahoma State University's faculty in the College of Agricultural Sciences and Natural Resources (CASNR) take a myriad of approaches to teaching through experiential learning, including international experiences, bridging the abstract in a traditional classroom, capstone experiences, and industry involvement. CASNR's Department of Horticulture and Landscape Architecture faculty and students participate in exchange programs with universities in Germany, Denmark, The Netherlands and Crete through the **H**orticulture in the **E**uropean **C**ommunity and **U**nited **S**tates (HORTECUS) Consortium. CASNR's Agricultural Economics classes focus intensely on the behavior of agricultural market prices. Understanding real markets requires mastering abstract concepts like supply and demand. Bringing industry clients into the classroom can be a daunting task for any faculty member with respect to the coordination and the risk of uncertainty involved. However, for two classes in very different majors, industry clients have proven to be powerful teachers, offering students hands-on experience as well as a career-place atmosphere. The New Product Development Center (NPDC) at Oklahoma State University quickly realized that product development is only half the battle when it comes to assisting clients.

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Impact of a Pilot Intervention on Student Learning and Attitude in an Introductory Biology Course for Science Majors

Authors: Michèle Shuster*, Amy Marion and Ralph Preszler
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Abstract

A clear need exists to improve student learning in the basic sciences, including introductory biology. Such improvements are generally recognized as emphasizing critical thinking skills and understanding of science as a process over mere acquisition of biological content knowledge. A large proportion of studies describing reforms and their assessments address primarily (i) introductory biology courses for non-science majors and (ii) upper division biology courses for science majors. We have adopted two substantial pedagogical changes in an introductory biology course for science majors, and provide evidence that they improve student learning and are generally well-received by students. Our approach has been to rearrange the content of the course into “integrated content modules”, in which basic foundational knowledge is coupled to corresponding applications of that material, and to introduce case studies, intended to enhance interest in and deeper engagement with selected topics. Based on a comparison of scores on identical exam questions between previous (“traditionally taught”) semesters and the instant (“revised”) semester, students performed significantly better in the revised semester, suggesting that the interventions improved learning on “standard” topics. We also observed a reduced rate of withdrawals in the revised semester, and higher exam scores on questions derived from case study material compared to questions derived from lecture material. Although encouraging, these two trends were not statistically significant in our pilot study. We are currently continuing our exploration of the impact of case studies on student learning in introductory biology.

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K-State College of Agriculture - Focus on the Total Student

Authors: Don Boggs*, Jackie McClaskey and Robert Holcombe
Kansas State University, Manhattan

Abstract

The Kansas State University College of Agriculture is committed to developing the total student to prepare well-rounded graduates for careers in agriculture and natural resources. We recognize that a great deal of student learning and development take place outside of the classroom. We feel the total student needs to be trained in a scientifically-based curriculum, have hands-on experience related to their major, be multi-culturally competent and globally aware, be an engaged leader of the community, exhibit a spirit of inquiry and discovery, display strong decision-making and problem-solving skills, and be a life-long learner.

This poster highlights activities and programs in the K-State College of Agriculture that help prepare the total student.

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Learn by Doing Pedagogy in Agriculture through Enterprise Projects

Jonathon L. Beckett, Lynn E. Moody, Mary A. Whiteford, and Mary E. Pedersen*
California Polytechnic State University, San Luis Obispo

Abstract

The vast majority of educational systems are designed to prepare students with a knowledge base that can be translated into a new context thereby demonstrating comprehension. In order to develop skills beyond comprehension, California Polytechnic State University has long embodied a “learn by doing” pedagogical philosophy. The method by which the “learn by doing” principle is implemented differs by program and educational objectives. Examples of program components that apply the “learn by doing” philosophy include internships, laboratory classes, and a capstone senior thesis project. Additionally, Cal Poly students are encouraged to participate in a culminating educational experience – Enterprise Project - designed to integrate information into a production system, and assess successful implementation of science and technology. Cal Poly has several commercial projects, i.e. livestock production, fruit and vegetable production, honey production, etc., through which students “manage” the projects under the supervision of a faculty member. Students participate in the enterprise projects after completing courses in the topic, and are held responsible for making decisions, performing the work for production, and marketing the product in a manner that maximizes profit for the commercial project. In return, the students gain credit toward their degree, and participate in the profits of the project. Through this method, the students are accountable for their work, and have the incentive to perform well. Additionally, the students gain work ethic, develop a sense of accomplishment, and cultivate an ability to work as a member of a team, but most importantly, apply their knowledge in a true commercial enterprise in a manner utilizing active learning that challenges them to analyze, synthesize and evaluate an entire system. Cal Poly’s “learn by doing” method of teaching is certainly not new. But it has been a guiding educational principle at the University for over 100 years, and continues to be one of the trademarks by which alumni claim their success. While the cost of education is drastically increased, the trade-off is increased comprehension by students, as well as ability to apply, analyze, synthesize and evaluate information.

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New Programs and Strategies for Learning, Discovery and Engagement: Transforming Undergraduate Education at University of California at Davis

Authors: Diane Ullman, David Rizzo, Roger McDonald, and Fred Wood
University of California at Davis

Abstract

Contemporary students need and want skills for interdisciplinary learning, focused career choices, leadership and lifelong learning. In the University of California (UC) system, we have continuously met the challenge of engaging and providing quality education to ever increasing enrollments. Our success in engaging students and providing them with contemporary skills has relied on creative new paradigms and strategies for teaching. We will highlight programs and teaching techniques that create a rich environment for learning, discovery and engagement for UC Davis undergraduates. First, the College of Agricultural and Environmental Sciences (CA&ES) supports the Science and Society (SAS) program, an academic program offering students across campus the opportunity to discover the interdisciplinary connections that link the biological, physical and social sciences with societal issues and cultural discourses. SAS transcends departmental structures and serves students of all majors and interests by providing a meaningful context for students to explore diverse subject matters through interdisciplinary and interdepartmental courses and seminars. The curriculum emphasizes pathways to discovery, the relations among disciplines, and the relevance of the sciences for enhancing the quality of everyday life. SAS also serves as an umbrella for several novel cross disciplinary programs. We will highlight the Contemporary Leadership Minor, the Career Discovery Group Program, and the Art-Science Fusion Program. Second, the Center for Leadership Learning has been recently created as a collaborative effort of the College of Agriculture and Environmental Sciences, the Office of Student Affairs, and Office of Undergraduate Studies. We will show how the Center brings together long standing efforts in each area and benefits from the synergistic relationship between the Contemporary Leadership Minor, numerous activities in Student Affairs, and a living-learning community in Undergraduate Studies. Third, we will explore the use of e-learning, a teaching strategy that will be a vital resource for the next generation of students and professors. We will highlight "Introduction to Nutritional and Metabolism", an upper division, on-line course focusing on normal metabolism of nutrients. The instructional modules use voice, text and animation to demonstrate basic and advanced concepts in nutrient metabolism of animals and humans. A computer demonstration of this on-line course will be provided.

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ProStar - A Retail Fertilizer Business Management Simulator

Authors: Patrick D. O'Rourke¹, Phil Hamilton², and Lisa Pond³

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Abstract

It is essential that undergraduate agribusiness management courses meet the needs of students for the job market of the 21st Century. One of the best ways to serve those students' needs is to simulate, as much as possible, the real-world business conditions faced by agribusiness firms in competitive markets. The ProStar® fertilizer management simulator accomplishes this putting the student-manager in a competitive market where profitability is impacted by their decisions and the decisions of their competing student-managers. Those decisions include setting prices, determining order quantities, choosing a credit policy and promotional program, borrowing and repaying loans and buying or selling equipment.

The ProStar Fertilizer Management Simulation is used both in the undergraduate/graduate classroom setting, and also as the center of a workshop that is presented by the simulator author, Patrick D. O'Rourke. Both educational settings have met with success. The purpose of the retail fertilizer management simulator in an undergraduate course is two-fold (1) to bring the "real-world" into the classroom; and, (2) to bring together and show the interdependence among management decisions in marketing, logistics and finance.

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Quest for Effective Educational Practices at Auburn University College of Agriculture

Authors: D. Mulvaney*, J. Groccia, P. Curtis, and D. Williams
Auburn University, Alabama

Abstract

The College of Agriculture at Auburn University recognizes that we must become more adaptive in our leadership around curricula and responsive to needs of students, and their future careers and employers. The institution has a culture that supports high quality teaching and learning as evidenced by efforts to revise teaching evaluation constructs, establishment of curriculum review processes piloted in key departments, establishment of peer-review of teaching protocols, implementation and support of faculty learning communities to catalyze engagement in the theory, research and practice surrounding teaching pedagogies. AU CoAg has programs, policies, competent/caring faculty, practices and organizational culture which focuses on student learning and success by helping students establish themselves as independent and interdependent learners.

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Secondary-School Appropriate Educational Resources that Explain How Biotechnology Improves Crop Production & Protects Plants From Pests and Disease

Author: Kathy Frame*
The Biotechnology Institute, Arlington, VA

Abstract

Biotechnology enables farmers to increase the Vitamin A-content of rice and to grow corn for ethanol production. Biotech scientists engineer plants that resist diseases, detect traces of chemical weapons or biological agents like anthrax, and grasses and trees that remove heavy metals from contaminated soil. The Biotechnology Institute's bi-annual publication, *Your World* explains biotech research and innovation to 7th – 12th grade teachers and students. It highlights breakthrough science and stimulates discussion and exploration.

Our poster will display excerpts from ag-biotech articles and it will also feature a sample activity from *Shoestring Biotechnology*, our teacher training laboratory manual. As its name suggests, *Shoestring* allows science teachers to inexpensively and conveniently prepare hands-on biotechnology activities. Initially funded by the National Science Foundation and four corporate sponsors, *Shoestring* provides a valuable teaching tool and explains how the basic sciences (biology, chemistry and physics) integrate in this new field. Biotech's mass culture popularity makes it an ideal vehicle for engaging teachers and students. Since 2001, the television show *CSI* has generated immense interest in biotechnology-based forensic science. While capitalizing on biotech's popularity, *Shoestring* attracts science teachers and students to solid inquiry-based research and teaching.

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Student Development in the Food, Agricultural and Environmental Sciences: Integrating Learning, Discovery and Engagement

Donald R. McDowell*, Janice G. Brewington, Deborah H. Barnes and Kenrett Jefferson-Moore
North Carolina A&T State University, Greensboro

Abstract

Learning. Discovery. Engagement. These values define the land-grant educational system at North Carolina A&T State University. Our continued work in the classroom, the research laboratory, and the community support and advance our historical mission. Our tradition of teaching, research, and extension has helped us to prepare our graduates for a life of service to the state, the nation, and the world.

Learning: As a land grant university, we prepare our students to compete in a global marketplace for jobs and professions that may not have been created yet. The inquiry based learning pedagogies we employ—the hallmark of our Carnegie status as a “high research activity” university— also equips them to continue their educations in graduate and professional schools. Discovery: we focus on creating new economic opportunities as we search for workable solutions to the problems which plague our communities. The questions we face are complex and so, too, are our solutions. Thus, we adopt an interdisciplinary approach to research and problem-solving. Engagement: the problems that adversely affect our society help to shape our academic and research agendas. We are committed to integrating service and learning as a means to improve the world in which we live.

Undergirding this integrated model of learning, discovery and engagement is the University’s implementation of its new University Studies Program, fall 2006. University Studies (UNST) is the interdisciplinary general education curriculum that provides the intellectual foundation for the University’s degree-granting programs, including the food, agricultural and environmental sciences. The UNST goal is to provide students with a framework for critical inquiry that serves as a foundation for continuing academic development and life-long learning. This new core curriculum, with emphasis on discovery, inquiry, analysis, and application, was developed to promote broad-based critical-thinking skills, effective written and oral communication of ideas, appreciation for diverse cultures, and commitment to ongoing civic engagement, and social responsibility. This significant change in the University’s general education requirement strongly supports the land-grant model of learning, discovery and engagement. It also helps our increasingly diverse students to understand the interdisciplinary nature of knowledge, encourage cross-disciplinary dialogue, and promote the development of intentional learners who take responsibility for their learning.

With a combination of diagrams, graphs, and charts we will depict the links between the University Studies curriculum and the integrated land-grant model pedagogy.

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Undergraduate Education at the Agriculture-Environmental Science-Biotechnology Crossroads

Authors: Maureen Dolan, Steve Green, Alan Christian and Robyn Hannigan*
Arkansas State University, Jonesboro

Abstract

Undergraduate education in the Sciences at Arkansas State University centers on the crossroads of agriculture-environmental science-biotechnology. Undergraduate students explore real-world agricultural issues and theories as they connect to emerging environmental and biotechnological issues. Whether in the classroom, laboratory, or field our students are exposed to the interdisciplinarity of the sciences. Our students are immersed in discovery-based cross-disciplinary training where students engage in laboratory and field-based research at the crossroads of agriculture, environmental science, and biotechnology through curricula designed to ensure that students trained in agricultural science are both strong in basic sciences as well as applied agricultural science. ASU offers unique research and educational programs to both students at the University as well as public outreach programs and training programs for undergraduate students from outside the University and K12 students and teachers throughout the Mississippi Delta.

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Undergraduate Research

Authors: Wayne L. Banwart*, Ruth Watkins, Prasanta K. Kalita, and Karlie Elliott
University of Illinois at Urbana-Champaign

Abstract

Undergraduates at the University of Illinois at Urbana-Champaign are encouraged to participate in research experiences to introduce them to the fascinating and challenging world of discovery. This experience is intended to increase their professional competency and help prepare them for the challenges of the 21st century. This poster briefly describes programs at the University of Illinois that would offer the opportunity for undergraduates to participate in research. Funding for the programs is provided by recurring endowment monies which makes the program sustainable. Last academic year over 10% of the 2,250 undergraduates participated in some type of research. The conclusions shared are benefits we see from this type of experience and are reasons we believe it to be a valuable component of educating students.

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