College of Agriculture and Life Sciences 2003 – 2004 ETF Expenditure Report

The College of Agriculture and Life Sciences offers degree programs in a unique combination of disciplines incorporating the basic life sciences and applied agricultural sciences. The college offers 10 associate, 40 baccalaureate and 26 graduate degree programs to 4691 students. In addition, the College serves the university community by offering general education science courses in biology, zoology, entomology, botany, biochemistry, microbiology, plant pathology, toxicology, genetics, food science, nutrition, poultry science, soil science, animal science, and crop science. With an emphasis on teaching about and with the latest technology, the Educational Technology Fund (ETF) is essential to the successful delivery of laboratory intensive courses. ETF dollars are crucial for meeting student Information Technology needs. CALS also provides ETF support for shared facilities in CHASS (Sociology & Anthropology) and PAMS (Chemistry/Biochemistry and Statistics). The College’s ETF allocation is $1,491,000 and includes $354,144.00 for Biotechnology and $1,136,856.00 for CALS program needs.

1. Categorized ETF Expenditure Summary

Expenditures reported in the narrative represent the College of Agriculture and Life Sciences’ departmental expenditures and do not include the Biotechnology ETF expenditures. An itemized list of expenditures by account code including the Biotechnology funds managed through CALS follows in Section 3 of this report.

a. Personnel expenditures represented 10% of the CALS ETF allocation.
   • $43,805.78 was expended for professional support staff. At the College, level a computer consultant position was dedicated to providing better computing services to students.
   • $71,580.19 was spent for student-workers/staff. These individuals include computer lab proctors and “wet” laboratory student assistants.

b. IT infrastructure, equipment and services (computing labs, networking, etc.)
   • $347,893.44 or 31% was expended for IT infrastructure, equipment and services. This included replacing 78 laboratory computers and 35 departmental computers. PDAs were purchased for the Crop Science department’s plant identification initiative and for upgrading the GIS laboratory in Soil Science.

c. Non-IT infrastructure, equipment (experimental labs, wet labs, etc.)
   • $525,629.10 or 46% of the allocation was spent for non-IT or laboratory equipment.

d. Facilities (repairs and renovations, furniture, etc.)
   • $57,492.33 or 5% was expended for repairs and maintenance of equipment. Microscopes and other laboratory equipment must be serviced in order to function properly in the laboratories. This cost ranges from $200 to $6,000 per scope.

e. Discipline/instructional related field trips, professional development/experiences, travel, conferences, services etc.
   • $66,055.06 or 6% was expended for field trips to business and industry but primarily for transportation to off campus field facilities for hands-on laboratory experiences in biology, horticulture, zoology, entomology, and animal science. Students must travel to these sites in order to conduct laboratory work and view plant and animal specimens in their natural habitats. The students also learn the appropriate management techniques and implement the latest technological practices at the animal research facilities.

f. Other/miscellaneous
   • $24,400.10 or 2 % was spent for other expenses such as insurance, shipping or other fixed services not classified in other categories.
2. **Justification/Purpose of Expenditures— strategic overview**
   
   a. New and/or transformative initiatives undertaken with ETF
      
      - Describe how your unit has used funds in progressive and innovative ways

      New technology initiatives included the infusion of handheld technology. With Zire71 Palms, College Ambassadors managed their schedules, learned to capture images at College events and delivered presentations via the PDAs. Animal Science students managed dairy records using PDAs at the research facilities and Crop Science students collected and presented field data. GIS laboratory units were replaced by wireless Tungsten Cs. Entomology, biology and zoology expanded student access via wireless computing.

      Equipment replacements provide opportunities for teaching the latest technologies. For example, Zoology’s purchase of PCR equipment from ETF funds facilitated the addition of a cloning experiment to ZO 160.

      - Describe how your unit continues to rethink and reassess use of funds to improve teaching/learning/business models to maintain nimbleness, adaptability, etc.

      This year the College monitored printing in all its labs. In June, CALS began a transition to Wolf Copy, re-allocating funds to other ETF needs areas.

      Phytotron student research space was not sufficient to meet BIO 183 needs. Development of field research projects and identification of supplemental on-campus laboratory sites was efficient and cost effective, thus maximizing the return on ETF investments. Moreover, the educational experience was enhanced due to the greater variety of research.

      Creative scheduling and use of general laboratory supplies and equipment is required to operate multi-section laboratories for approximately 2,250 students in BIO 106, 181L, and 183L. Specific large equipment purchases, like the two Genesis 5 Spectrophotometers supplemented existing instruments used in studies of enzymes, plant pigments, and other biological molecules.

      In Zoology, more than 1200 undergraduate students and 70 graduate students benefited from ETF funds. This translates to an efficiency of approximately $70 dollars per student, a very conservative figure considering the expense of modern lab equipment, biotechnology reagents and computer technology. This efficiency is attained by teaching labs of 24 students, having shared computer facilities for undergraduate and graduate students, and having students work together whenever possible.

      Animal Science is utilizing state-of-the-art computer programs for formulating rations, conducting breeding/genetic evaluations, and simulating real-life situations in our Nutrition, genetics/breeding, and Management courses impacting 500 students/year. ANS used large, dissectible plastic models of cows, sows, and mares to enhance learning about the live animals without the cost of live animals.

   b. Actions taken to improve efficiency/return on ETF investments
      
      - Describe your unit’s efforts to increase/maximize the value of ETF expenditures

      The 78 replacement computers had higher processor speeds and increased memory so students are able to process data, design and manipulate graphics and multitask quicker and more efficiently. Roving lab proctors increased assistance by 12% while maintaining the same operating hours.

      When reasonable, purchases are made in bulk to reduce the unit cost. Annual scheduled maintenance is promoted to extend the functional life of equipment purchased with ETF funds.

      Toxicology uses the funds to benefit the highest number of students through the establishment of workstations and multi-user “core” facilities. This approach also has led to additional interaction
among students and research groups by facilitating the “cross-talk” among students, faculty, and scientific staff.

Student assistants are asked to take supervised teaching for credit rather than paying them with ETF funds.

c. Unmet ETF-eligible needs
   • Describe funding shortfalls for needs that could be funded by ETF
   College requests exceed the available ETF allocation by $500,000 to $1,000,000 each year.

Costs of student assistants exceeded what was allocated; Travel costs for field laboratories and guest speakers exceeded what was allocated; Departments need upgrades for microscopes for graduate classes; Need more equipment for Video Microscopy/Confocal Microscopy technique courses: Need Environmental growth cabinets and refrigerated centrifuge for plant physiology courses.

Life sciences programs are unable to make major equipment purchases to provide students with hands-on experience with some of the latest technology used in molecular biology. For example, much of the “omic” approach to understanding fundamental and applied molecular biological sciences is making a natural progression from “genomic” techniques to “proteomic and metabolomic” techniques. These newer approaches require expensive instrumentation that is presently unavailable to either graduate or undergraduate students at NC State.

DVD cameras and other multimedia equipment for student use is needed to allow students to develop short video presentations for classroom projects and to record presentation that will allow better critique. The multimedia equipment would allow students to provide feedback to each other and encourage improvement in their communication skills.

Due to a funding shortfall, Biology purchased only two of the five Genesis 5 Spectrophotometers. Additional instruments would enhance efficiency by reducing the wait time of student groups in the laboratory.

Due to lack of increase in ETF funds that matches the increases in student enrollment in Biochemistry and the inflationary increases in the cost of materials and supplies, the department was unable to purchase new spectrophotometers or new pipetters. The shortfall is estimated to be about $30,000, which is the cost of these new and replacement equipment needed for the continuous improvement of our course offerings.

Microbiology delayed training the non-majors on the use of spectrophotometers because of the lack of money to purchase enough units to accomplish this goal.

Zoology needed to outfit additional labs to provide hands on experiences in upper level courses; Without such labs and field exercises we fall behind our peers in the quality of undergraduate instruction.

Animal Science freshman enrollments increased 32% so the main limitation is the ability to conduct enough labs to keep the number of students in each lab at 30 or fewer. This enrollment increase also means we need to increase the number of plastic models, dissection kits, animals, etc. so the students' educational opportunities are as good as (or better than) their predecessors.

In Plant Pathology the development of an international plant disease diagnostic facility is hampered by the lack of funds to equip such a facility with modern technological equipment and microscopy systems.

d. Assessment of impact of ETF investments on student learning
   • How and what does your unit measure to evaluate the effectiveness of ETF expenditures?
CALS uses a multiple approach including: freshmen computer survey to determine needs; course evaluation questions relative to the laboratory experience are contained with each course evaluation; exit interviews of graduating seniors by the department head also address the student’s perceptions of the quality of the laboratory experience. A majority of students express a high degree of satisfaction with the laboratories that they participate in. While these assessments indirectly measure the effectiveness of ETF expenditures, we believe that they adequately reflect student perceptions.

Through exams, quizzes, presentations and lab reports students demonstrate proficiency with the equipment and mastery of new technology. Successful graduates are employed in agencies using new and emerging technology and employers indicate satisfaction with graduates.

- In brief, what is your unit’s assessment of the impact of ETF investments on student learning

ARE and AEE found that students using the Classroom Performance System (CPS) scored about 10 points higher on exams than the control group. Initial evidence indicates the CPS is effective in bringing about student cognitive learning as students were more engaged in the teaching/learning process. A carefully controlled and designed experiment will be implemented this fall.

CALS students are continuing to use two large-format printers to create professional presentations for classes, symposiums and conferences. Quality posters provided students with a professional means to disseminate their research. Several won awards. For 2003-04, the college printed 722 posters.

ETF investments were invaluable to student learning in a variety of settings including the laboratories where computer workshops are used substantially to enhance learning. Additionally, ETF funding enabled students to engage in experiential, hands-on learning at the Phytotron and other on-campus sites as well as during laboratory-related off-campus field trips.

e. Planning and review process

- Describe your internal review process and level of student participation

The College uses a team approach for identifying, prioritizing and assessing ETF needs. The College team includes: Dr. Barbara M. Kirby, Assistant Director for Academic Programs; Mr. Thomas Young, Assistant Director of CAAT; Dr. Any Hale from the Academic Computing Advisory Committee; and Dr. Gerry Luginbuhl, Undergraduate Teaching Coordinator and Department Head for Microbiology. The administration discusses ETF issues with AgriLife Council members. Each of the 20 departmental committees includes the undergraduate and graduate coordinators, faculty members and students. Departments submit ETF requests to the CALS ETF web site. The site is open for review. The College committee reviews the requests and recommends allocations to the Associate Dean for Academic Programs. Each Department reports its expenditures annually to the College. Each year the need far exceeds the available funds by at least $500,000. Every effort is made to provide funds for courses, equipment maintenance and computing. A small amount is allocated for new initiatives when possible.

- List the names of all students involved with your ETF committee:

  Agricultural & Extension Education: John Conoley, Jason Chester, Alex Silliman; Poultry Science: Amelia Mallner, Devorah Marks, and John Small; Food Science: Tristin Berry and Jessica Childs; Botany: graduate students and students in botany classes; Toxicology: graduate student association executive committee; Crop Science: Sarah Hans and Sam Walton; Entomology: President and VP of the Entomology Graduate Student Association; Biology: Lisa Marie Hill, Eliot Martin Wickliff, Rediet Yilma; Microbiology: Homa Azargoon and Nathan Borden; Zoology: Anna Austin, Thomas Miller, Becky Brewer and Sarah Harvey; Agricultural Resources Economics: Sam Walton, Simla Tokgoz, Michelle Parker; Animal Science: Brandon A. Lowman, Christina M. Rush, Penelope M. Page, Heather S. Stahlhut; Horticulture Science: Kristen Cook, Horticulture Club President Heather Barkley, Horticulture Club Treasurer Nick Sagen, Logan Bristow Agri-Life Representative. Soil Science: Joel Gruver; Plant Pathology: Dennis Carey, Cara Rose, Andrew Gardner, Amber Harmon, Gabe Martin, Damon Smith, Courtney Reuter, Nikki Charleston, Julie Miranda, Lauren Charles; Sociology and Anthropology: Shannon N. Davis.
3. Itemized List of Expenditures by Account Code

CALS Allocation: $1,136,856
Biotechnology Allocation: $354,144 (See Biotechnology Report)
TOTAL $1,491,000

Fiscal Report

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<th>Object Code</th>
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<th>Number or Comments</th>
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<td>$1,490,998.36</td>
<td>$353,294.38</td>
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| TOTAL CALS & Biotech 2003-04 College 11 Total | $1,491,000.00 | $354,144.00 | $1,136,856.00 |

The College and Departmental ETF end-of-year expenditure reports for last fiscal year (2002-03) are available for student review upon request. All ETF expenditure reports will be posted to the Provost’s website and will be accessible by anyone who has a campus unity ID. In addition, the CALS ETF 2003-2004 expenditure report may be viewed by selecting the College Home page http://www.cals.ncsu.edu/ Select For Faculty and Staff then ETF. A unity ID and login is required to access the ETF report.

For questions, please contact Barbara_Kirby@ncsu.edu