Project Narrative

St. Bonaventure University (SBU) utilized its grant from the Department of Energy to purchase new equipment for its Biology, Chemistry, Physics and Mathematics departments. Due to two major savings from the original specifications, the University was able to purchase equipment for a Psychobiology animal lab and to purchase an upgrade from the Raman Spectrometer to an OLIS LED-source fluorescence quantifier in the Chemistry department. These are explained in more detail below.

Specifically within the Biology department, the purchases included a Confocal microscope, a Cryostat, and embedding and processing for micro-dissection. Of particular interest, the Confocal and Cryostat were used in BIO 362L (Developmental Biology Lab); BIO466 (Molecular and Cell Biology) and BIO291 (Genetics). The Confocal allowed students to engage in live imaging over extended periods, and the ability to study calcium fluxes. These instruments have been used to further independent student research projects overseen by several faculty members. Due to a private endowment, the equipment is also being utilized with specialized summer projects under the “Borer Fellowships”. This summer, three students have the opportunity to use this instrumentation. This instrumentation has also allowed faculty member, Dr. Julie Hens, to continue important research on understanding mammary gland and lung development and its signaling pathways of PTHrP, MSX-2, BMPs and WNTs as it relates to embryonic development and cancer.

The Chemistry department purchased a fluorescence spectrometer to complete its instrumentation suite. The founder of OLIS, Incorporated (a manufacturer of high-quality fluorescence and other spectrometers) offered a 50% Gift-In-Kind to the Chemistry department for a LED-source fluorescence quantifier as an option. This very unique instrument is specific to

high-sensitivity chlorophyll studies and is being used in the Chemistry Department, including CHML 401/402 (Physical Chemistry lab) and will be incorporated in several more labs as they are offered. This instrument and its revolutionary design have allowed the Chemistry department to teach students about outside-the-box instrument design. Students can perform testing faster with this instrumentation and the Foureir transform detector collects high speed excitations and emission spectra in either single or multiple colored LEDS. The Chemistry department also purchased a Grams A1 software core for advanced data processing and a Grams 3D for data display.

The Physics department purchased a Celestron 1100 GPS (XLT) telescope, a NexRemote control software kit, an Orion Parsec 8300C Imaging Camera and two Celestron 800 GPS (XLT) computerized telescopes. A computer workstation with LCD monitor and eleven workstations with MatLab software were also purchased.

Physics students receive instruction in the application of a widely used technical computing software package, (MatLab™) on up-to-date workstation computers. Students using these workstations include the PREG 220 (Intoduction to MatLab™); PHYS 451, (Applied Methods in Computational Physics); and PHYS 403, (Electronics.) These workstations with the specialized MatLab assist students in methodology needed for modern Engineering. The PRE103 Engineering Graphics also uses the workstations to provide instruction in Computer Aided Drafting, (CAD).

The new workstations are used by Physics majors to perform calculations, computational reports, and to collect data in PHYS 309 Experimental Physics. These workstations find multiple uses in many if not all the Physics major courses, (PHYS 103, 104, 201, 203, 301, 302, 304, 309, 404, 408 & 451).

A marked improvement in functionality and number of telescopes, the Celestron 1100 GPS and two Celestron 800 GPS, have allowed students taking the astronomy classes to more easily aim the new computer-guided telescopes, and view astronomical objects more easily on computer monitors.

Under the Mathematics department, budget allowed for the renovation of De La Roche Hall, (DLR) Classroom Laboratory 106, which is 550 square feet. Tables, chairs, and software were purchased for both DLR Classroom 106 as well as DLR Classroom 303, which is a smaller math lab and where students can work in cohesive groups. Also purchased were fourteen workstations with data lines, a projector and sympodium, document camera, chalkboards, telephones, and a keypad lock system as specified in the original budget to equip a newly renovated classroom.

All but one statistics course was taught in the new computerized classroom. Statistical software was used extensively by the four different statistics instructors involved for demonstrations, and occasionally by students. Student usage has increased as we become more familiar with the systems and adjust teaching styles to take advantage of it. This has impacted 5 classes and 106 students.

The Geometry for Elementary Education majors was taught in the new classroom with extensive use of the dynamic geometry software by both instructor and students.

A pre-calculus and a calculus class were taught in Classroom DLR 106, with software used for demonstrations. Student use for calculus and pre-calculus will be increasing in the future. This has impacted two classes with 49 students.

The remedial software in the math lab was available for the students who visited the math lab. Again, as we become more familiar with the software, and as more of our faculty become

trained in how to use it, usage will increase. Last year, the Math department had 400 visits from about 180 different students.

There was a savings from the Physics workstations which was used to purchase equipment for an animal lab. This animal lab has been prepared for FY13, and is located in DLR Laboratory 110. Dr. Darryl Mayeaux will be using this laboratory for PSYC 301: Experimentation in Animal Learning and Memory (Lab) and the Psychobiology Laboratory. Equipment purchased were three manual stereo-toxic injectors, two BSL Psychobiology, two IMAC Intel computers with keyboards, two T3 Vaporizers (FF ISO), double tank holders, Vapor stick with flush valves, lead sets, multiple stirrer hotplate kits, staining slides, stirrers, micro-dissection scissors and wound clips. This lab uses Syrian (golden) hamsters and research will be conducted on individual recognition, social learning and memory, and the mammalian brain process.

A. Project Goals and Measurable Objectives

The purchase and installation of the equipment has provided the following:

1. Opportunities for earlier exposure to research techniques.
2. Student and faculty opportunities to use a wider range of instrumentation
3. Opportunities to introduce additional instrumentation in upper level courses.
4. Improved environment for significant upper-level undergraduate research.

B. Project Outcomes

1. There were an increased number of students participating in a research project during the spring, 2012 semester. Six upperclassmen participated in research projects.
2. Three students were awarded prestigious summer scholarships as part of the Dr. Arnold T. Borer Summer Research initiatives. One sophomore and two junior biology majors will work 1:1 with professors within the Biology department. A junior biology major will work with Dr. David Himley, assistant professor of chemistry on the functions of PLP, and pyridoxal-phosphate; a junior biology major is working with Dr. Nick Mitchell researching effective methods to culture different types of neuronal cells; and a sophomore biology major is working with Dr. Julie Hens on mammary gland research.
3. Ability to use equipment, research and to sustain programs to advance a proposal worth consideration for the S-Stem grant to the NSF to be submitted on August 8, 2012.
4. Increased number of science majors on campus. The fall semester of 2011 saw an increase of 9% more science majors than fall semester of 2010, and specific increases within the Biology and Chemistry majors.
5. The School of Arts and Sciences has introduced an annual symposium which will be attended by notable alumni.
6. The University's articulation agreement with George Washington University School of Medicine continues to be a pathway after St. Bonaventure with a number of seats guaranteed.