

A Technology-Enabled Learning Environment

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Gainesville College is a two-year college, which is a unit of the University System of Georgia. It is located in Gainesville, which is fifty miles from downtown Atlanta, located on the shores of Lake Lanier and is the gateway to the Northeast Georgia Mountains. Gainesville College was established in 1963 and has grown to an enrollment of 3500+ students. It now has a campus in Athens, Georgia, which is shown significant growth in a period of a few years. Gainesville College has developed a reputation in for teaching excellence and innovation in the University System, which is validated by several measures. GC students do very well upon transfer to baccalaureate programs, increase their GPA on the average, and the College received the most exceptional commendations in its recent self-study and re-accreditation process.

Gainesville College Science and Engineering Division offers a wide range of programs in physical and earth sciences, life sciences, health professions and engineering. The Science program has been significantly shaped by influences from Project Kaleidoscope. In 2000, the new science building at Gainesville College was inaugurated and was the culmination of an intensive planning process of over four years. Starting in the late 90's faculty teams from Gainesville College attended PKAL disciplinary meetings in Physics, Chemistry, Biology and Earth/Environmental Science. These meetings began a process of curricular re-evaluation in the Science division, as we collectively sought to envision a fusion of new pedagogies, technologies and the physical spaces that the new building would provide. The PKAL publications on facilities design was an invaluable aid to begin to visualize spaces that would create an optimal learning environment for science. This building would also have to serve the science needs of its service area for at least a few decades. The division chair, Lewis Rogers, initiated the initial connection with PKAL at the beginning of the planning process for our new science building.

The form and function of the new Science building is intimately informed by the experiences GC faculty have had with PKAL. The learning spaces are wired up with computers and learning technologies that promote interactivity, collaboration, competition and fun in learning. New spaces have given way to new programs and a growth in student enrollment in the sciences. Technology is a learning multiplier if it is integrated into teaching/learning in a philosophically coherent and assessable manner. In the Sciences, technology can measure and model natural phenomena, in near real time. This brings the laws of nature and its inherent mathematical patterns into the direct experiential domain of the students. Nature can be beholden directly by each student in an exploratory manner with technology. Guided inquiry can foster discovery and learning by living out the scientific process. Most importantly, since most of the courses taught are at the freshman and sophomore level, the primary intent is to have our students learn the fundamental ideas of science with clarity. Surveys of our graduates shows that most of our students go on to complete at least a baccalaureate in the sciences, with many going on to professional or graduate school.

Programs like Geology, Physics, Integrated Science and GIS have opted for a flex classroom format, which integrates laboratory and lecture spaces together. There are typically a dozen similarly equipped stations each with networked computers with fast web access. Computer access is ubiquitous in the science building and across campus, and students have access to an outstanding Information Technology infrastructure, which has statewide recognition as a leader in this area. The instructor's stations have a computer and a ceiling mounted projector and instructional hardware and software particular to the discipline. Programs are encouraged to experiment with new teaching and assessment methods and a significant part of the curricula is developed in-house. The Learning Communities project has lead to creative linkages between science, mathematics, engineering, and technical writing courses.

The Integrated Science course sequence, and the associated curricula was developed by Sheryl Williams to present science as a set of coherent principles applicable to both the life and physical sciences, to the non-science major. Chemistry has excellent laboratories and classrooms, with computer interfaced sensors and spacious facilities and specialized equipment. Chemistry, coordinated by Jim Konzelman, a F21 class of 2002, has been successful in getting funding to improve hardware/software for the chemistry classrooms, laboratories and the purchase of a smartboard. He has developed linkages between chemistry, ecology, and biology courses as a part of GC Learning Communities. He is a strong catalyst for integrating technology in the chemistry program in an assessable manner. Biology uses virtual reality and animations to explore the human anatomy and other biological phenomena. The Biology facilities are particularly spacious and well equipped, commensurate with the size of the program. Caywood Chapman coordinates the Biology group and has integrated several PKAL inspired influences into the Life Science courses and the facilities. Alex Lowrey, F21 Class of 2000, actually travelled to some of the science facilities listed in the PKAL report, which really helped in the planning process. The fledgling engineering program has grown rapidly with an increasingly larger cohort of students under the guidance of Jeff Turk. Our Division is one of the top feeders of transfer students to Engineering institutions in Georgia, where a significant number improve their GPA's.

The GIS program is noteworthy in that it has developed a large enrollment in a few years, obtained considerable external funding and paved the way to the establishment of an 'Institute for Environmental and Spatial Analysis' in collaboration with Universities in the region. It has developed a certificate program in GIS and in Environmental Science. An excellent computing infrastructure provides critical support to this geo-informatics' endeavor. This program began as one of several national pilots at the two-year level. Due to its inherently interdisciplinary nature it has been a vehicle to recruit students into the Earth and Environmental sciences. The graduates of this program are in great demand in the regional GIS endeavor. A four-year degree in environmental and spatial analysis is currently under construction, and will come to fruition in the near future. This program has won the 'TERRIFIC' award of the Georgia Economic Development Association in 1998. This achievement is primarily due to the untiring efforts of Chris Semerjian.

The physics flex laboratory/classroom has opted for a studio-like format with twelve self-contained stations with networked computers, and Vernier ULI and MPLI interfaces with sensors, and the entire complement of apparatus needed to support laboratory curricula. A smartboard relieves students from the 'tyranny of transcription' and frees up intellectual energy for interactive engagement with the subject. The smartboard preserves the spontaneity in interactive lectures and problem solving activities, with students helping construct problems that they solve, and a record of the 'session' can be accessed from the class website. Wireless polling keypads allow for a real time measurement of the learning state of the class with the instant display of results. Students submit responses to personalized homework on the Web, which is instantly graded and recorded. Video Capture and GPS units allow students to analyze real life motion, including their own, to unravel the underlying physics. Students construct their own simulations to explore physical phenomena and develop scientific visualization and interpretive skills. Other institutions in the state have adapted parts of both the curricula and classroom design and two regional AAPT meetings have been hosted at this facility. J.B. Sharma, F21 Class of 1998, was awarded the CASE/Carnegie Georgia Professor of the Year in 1999.

A critical element in using technology in instruction is having a technical infrastructure and support. Innovation in teaching/learning can only be sustained with quickly accessible and capable support. In technologically aided guided exploration, expect the unexpected. In a situation where a dozen or more computer based measuring instruments are simultaneously operating in several different classroom/laboratories, there are many things that can go wrong. Failure of technology in instructional settings can be a frustrating and demoralizing experience for teachers and learners. This demands support

that can rapidly solve these problems, and this is critical to the smooth facilitation of technology-enabled learning. Seamlessly deploying varied scientific software on a network operating on Windows XP has come with its attendant problems needing custom fixes. We are fortunate to have this type of an infrastructure due to the vision of our Director of Computing Rick Coker. We have exceptional and innovative technical support from Wally Beck, with a major in physics, and a former student.

All of the science programs have extracurricular activities in the form of academic clubs, lecture series and seminars. The intent is for students to see how science can be a culturally and socially transformative force and influence the creation of enlightened public policy. There is a very active K-12 outreach for science and the sciences host the regional science fair and the science Olympiad every year. Workshops and courses are held for area science teachers in the summer. A particularly rewarding activity has been the development of summer science camps for elementary, middle and high school students, in the new science building. The new science building has been a professionally rejuvenating experience. Most of the science faculty has participated in PKAL meetings and activities. Innovation and the scholarship of teaching remains an integral part of the culture of the science division and of Gainesville College.