



January 2010

Engaging Science - Advancing Learning Continued...
Drs. Stephen Kucera, Fred Ledley and Susan Gorman

VISIT OUR BLOG AND SHARE YOUR THOUGHTS!

<http://pkal-engaging-science.blogspot.com>

PKAL's founder and past President, Dr. Jeanne Narum, assembled two working groups to continue the conversation that occurred at the AAC&U meeting in Providence in November, 2008. Her vision, and the preliminary sketches of ideas and insights from the working groups are posted at this blog site.

The groups developed a survey and we encourage you to take this survey to help in this effort.

What is happening at your institution to make a positive impact on STEM learning in your students?

You can help make Jeanne's vision for this project and this important effort a success by sharing your institutional experiences and reading what colleagues at other institutions are doing.



Department of Natural and Applied Sciences Strategic Planning - 2005-2007

Fred D. Ledley
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Presentation at AAC&U National Meeting – January 2010

Strategic Planning

- June 2005--February 2007
- Within a decade of major institutional change at Bentley
 - construction to create 100% residential campus
 - investment in information technology
 - improved quality of undergraduate students
 - hiring of first Dean for Arts & Sciences
 - launch of interdisciplinary “Liberal Studies Major”
 - recognition as “top 50” business school
 - Bentley College became Bentley University
- Commenced with hiring of outside department chair
- Lots of time and hard work by entire department

Key elements of plan

- Celebrate past accomplishments
- Align department mission with that of institution
- Align department organization and operations with mission
- Focus on strategic domains that encompass areas of faculty expertise and focus on topics of student interest
- Leverage institutional strength
 - quality of students
 - information technology
 - Liberal Studies Major (LSM)
 - business focus of institution

PAST, PRESENT, AND FUTURE

The faculty and staff of the Natural and Applied Sciences Department are proud of our more than 40-year history of teaching, research, and service to the Bentley community. We are proud of the role our Department has played in educating our students in science, in Bentley's evolution as a center for innovative business education and scholarship, and in the emergence of vigorous Arts & Sciences programs. In this plan, our Department affirms our commitment to our students and their success in the scientifically-grounded Innovation Economy of the future.

OUR MISSION

The Department of Natural and Applied Sciences educates students and disseminates new scientific knowledge as partners in an academic community dedicated to uniting the rigor, relevance, creativity, and intellectual dynamics of liberal arts and sciences to business.

The primary mission of the Department is to prepare our students for careers and for life by providing them with an awareness and understanding of the forefront of scientific knowledge, with an appreciation of how the application of scientific and technical innovation can transform our world, and with the ability to make informed and responsible choices concerning the personal, business, social, and ethical issues arising from scientific discovery.

The Department also embraces advancing the translation of science for the benefit of individuals, industry, and society through applications in innovative businesses, business processes, and products.

OUR STRATEGY

We will achieve our Mission by:

- Establishing integrated curricula, scholarship, and service activities in ~~three~~ **two** strategic domains:
 - ~~Consumer Product Dynamics~~
 - Earth, Environment, and Global Sustainability
 - Health and Industry
- Focusing Departmental organization and operations with strategic domains.
- Aspiring to excellence, rigor, and relevance in everything we do.
- Facilitating the personal well-being and professional success of our faculty and staff.
- Establishing and achieving discrete measurable goals.

Strategic Results – 2007-2009

- Launch of two concentrations in LSM
 - Earth Environment and Global Sustainability
 - Health and Industry
- Four new tenure track hires
- >\$150,000 new instrumentation for analytical chemistry
- Partial renovation of chemistry teaching laboratory
- New data and analytical (sandbox) laboratory
- >30 fold growth in number of students enrolled in science-based minors or LSM concentrations
- Many curriculum innovations
- Increased research productivity
- More work for everyone in the department



Engaging Science Continued: What Institutions are doing to Advance STEM Learning

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Stevenson University

23 January 2010
AAC&U, Washington, D.C.

The PKAL Story at VJC/SU

- 2004: Villa Julie College (VJC) was named a Leadership Initiative Institution with Project Kaleidoscope under the “Research Rich” umbrella. (Note: VJC became Stevenson University (SU) in 2008/2009.)
- Established a team of five individuals committed to transforming STEM education at VJC.
- Team members included one faculty member, two department chairs, one division director, and the vice president for academic affairs.

The PKAL Story at VJC/SU Continued ...

- Team met weekly to read, discuss, reflect, and plan.
Made a substantial time investment.
- Obstacles to progress included obstinacy, apathy, fear, and financial constraints.
- Mantra: “Small Baby Steps”
- Developed a community of science on campus through a collective, collaborative long-term process of communication and dialog.
- Developed a vision statement and shared it widely (banners, brochures, and the like).

The PKAL Story at VJC/SU Continued ... What Worked

- Integrated inquiry and research into science and mathematics curricula.
- Faculty reward and recognition: counts in load, counts as scholarship, counts toward promotion.
- Established a full-time, paid Summer Science Scholars Research Program for faculty and students.
- Established a monthly professional Seminar Series with invited speakers from the local community representing the different disciplines in the School of the Sciences.

The PKAL Story at VJC/SU Continued ... What Worked

- Engaged in outreach programs for middle school students: Summer Science Camp and Expanding Your Horizons.
- Awarded NIH grant funds to establish an Office of Research Development (NIH/NICHD/EARDA #1 G11 HD051258-01)
- Awarded funds from the Maryland State Department of Education (MSDE) to serve as the Affiliate University for the emerging Project Lead The Way® Biomedical Sciences program.
- Established a monthly professional Seminar Series with invited speakers from the local community representing the different disciplines in the School of the Sciences.

The PKAL Story at VJC/SU Continued ... What Worked

- Substantial increase in grant-writing activity at the University.
- Students and faculty are presenting their work at local, regional, and national meetings.

What We're Still Working On ...

- Transforming the non-majors STEM curriculum as we've transformed the curricula for our majors.
- Establishing student learning objectives for science and quantitative literacy for the non-majors.

A journey of a thousand miles
begins with a single step.

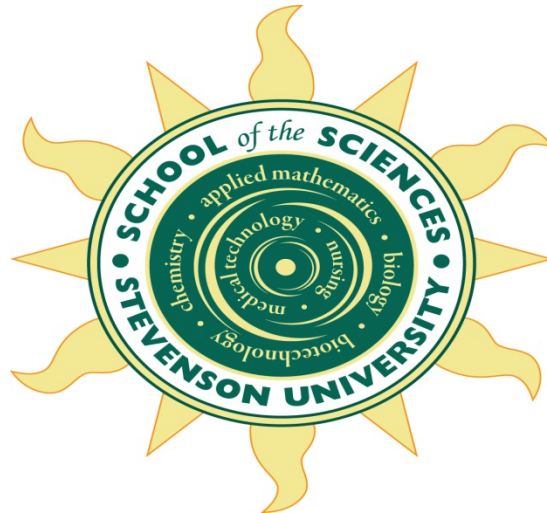
- Lao-tzu

Small, baby steps.

- Stevenson University's PKAL Team



The School of the Sciences at Stevenson University makes inquiry the foundation of a creative synergy between students and faculty that enhances student learning.



Dr. Steve Kucera
Associate Professor of Biology

Perspectives on improving STEM education at UT



A medium size, comprehensive private University with a total student population of about 6,000. No graduate programs in the sciences, but the sciences are some of the most popular majors of choice by undergraduates.

Talking points – major themes

Perspective as a former interim Dean who has returned to the faculty teaching majors courses in biology...

--An opportunity existed in the founding of our new College of Natural and Health Sciences from faculty who were part of the much larger former College of Liberal Arts and Sciences.

-Worked to foster a collaborative environment among the faculty who embraced learning outcomes and their measurement as part of their responsibilities as faculty for the courses they teach and the programs they support. This was not forced on the faculty with no notice – they were given 1 year's notice that in the following evaluation cycle. This established a connection of creating learning outcomes and outcomes assessment in the self evaluation written by faculty and in Dean's evaluation. If we say we value these processes, we need to reflect on them as faculty and administrators should be evaluating this work annually in performance evaluations. Successfully advocated for the creation of paid outcomes assessment coordinators within departments to support these efforts.

--Encouraged and communicated the expectation that faculty value continual renewal and innovation in the pursuit of their teaching. Continue with what worked, but self-assess and be creative.

--Encourage innovation without fear of reprisal from students in student course perception surveys (commonly called faculty evaluations). Briefly discuss our faculty-led effort (teaching effectiveness task force) across the U. to create an instrument whose focus is on student learning. To quote from the authors (a psychologist, sociologist and biologist of a manuscript on the process and outcome that is accepted pending revision in the International Journal of Scholarship of Teaching and Learning, " a dramatic shift in the student evaluation instrument as we move from a focus on emotive responses regarding instructional methods to a focus on how what the instructor does helps learning (i.e., a student might not agree with the presentation style an instructor used, but he or she still can learn a lot in that environment)." This is done almost exclusively on-line.

--Institutional/Top Administrative Leadership (President/Provost) support: Investment in Science infrastructure (building, research grants and teaching excellence grants), 1 hour for 1 hour contact hour system and linking the process of science to labs that are taught by FT faculty in the departments.

--Faculty-led effort to create a new CNHS mission and its points of emphases that speak to STEM education. Likewise for the efforts of biology recently to revise their mission. Emphases in engaging undergraduates in research. Many faculty pursuing inquiry-based laboratories, instead of canned laboratories, to provide deeper learning of science and its methods.

--I requested Bio and Chem create materials to be posted on ut.edu to help new majors prepare for intro courses and to communicate to the admissions folks the availability of these materials to prospective students. As a faculty member, I pointed my students to this information over the summer before they began their formal coursework.

--Partnership with our regional science center, the Museum of Science and Industry (MOSI) and their National Hispanic Scientist of the Year event, which is designed to inspire minority children, particularly Hispanic youth, to learn more about the sciences by visiting their facility and meeting the Scientist. This partnership between UT and MOSI is almost 10 years old and area H.S. science students come to the UT event and get to meet the Scientist as well.

Visit: <http://www.mosigiving.org/nahiscofye.html> and

<http://www.facebook.com/pages/Tampa-FL/National-Hispanic-Scientist-of-the-Year/199532440595>

for more information.

Some ideas on where we need to go to continue to improve STEM education at UT:

--More deeply embed learning outcomes in our programs. For many this is new at the level of their courses (even though it is in our Faculty Handbook).

--Focus efforts on non-majors. Problems - grade distributions of PT vs. FT faculty for the same courses (a faculty led effort by a former administrator [yours truly]) and not a punitive approach to correcting what, in some cases, is a severe problem, but taking a constructive approach that integrates learning outcome expectations to the PT folks and assessment coupled to possibly mentoring by the Chair and/or FT faculty.