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PKAL Symposium on Administrative Leadership 1993

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As David Letterman has his "list of ten" that he usually uses at the beginning of his show, so I have my own list of ten- Ten Laws of Building Natural Science Communities—as an introduction to my talk this evening.

10. Disrali's Law of Student Enrollment Projections: After the new science curriculum is in operation, the number of students attracted by the excitement of the program will dramatically increase enrollments in the sciences—or which no additional room was planned. (Disrali said "never make projections—especially about the future").

9. Keller's Law of Community: At the end of a long careful process to build community, consensus, and support, there will always be one person who will protest saying: "I was never asked to participate!"

8. Monson's Law of the Promised Gift: Upon reading the will of a donor that the college has carefully courted for several years, the lawyer informs you that the bulk of the estate is set up in a trust for an 18 pound fluffy cat.

7. Gotti's Law of Project Cost: No matter how large or small the science and mathematics project, it will always be more than the college can afford.

6. Physical Plant's Law of Responsibility: It's always Physical Plant's fault.

5. Wrights Law of Design: No matter how careful an architect is in involving user groups in the design of the science facility, there will always be someone who will cry out: "Gosh, this is sure different than the drawings."

4. Dober's Law of Location: The best site for the science building is always on a faculty parking lot.

3. Einstein's Law of Instrumentation: Two weeks after moving into a new science building, the sciences will be given an expensive piece of equipment for which no space was planned and for which there is no space available.

2. Hubbell's Law of Science Faculty: While the new building is under construction, the faculty member who demanded the most exacting space be designed to reflect his or her unique research needs, will be hired away by the University of Texas.

1. Lidsky's Law of Science Buildings: Over time, all science buildings become humanities' buildings.

These laws are a light-hearted way of saying that the process for creating an improved environment for strengthening undergraduate science and mathematics—whether it is facilities, curriculum, staffing, or building community—is complex and fraught with unexpected issues and factors that could influence long term utility and success.

Faculty are beginning to understand "what works", but unless these ideas are put into the broader concept of "who cares" little change will occur.

Let me touch upon a number of administrative questions and areas of concern that colleges will have to address in order to make significant improvements to the sciences and mathematics on your campuses—to sustain the momentum for those improvements.

I will cover three areas: 1) mission and academic plan; 2) teaching and research; and 3) process, organization, and responsibilities.

In the spirit of this Project Kaleidoscope Symposium, I'll begin with some leading questions concerning Mission and Academic Plan—the instruments that set overall goals and objectives for the college or university.

- When was the last time that your institution revised or reaffirmed its Mission Statement and academic plan?

- Do you have an approved and current academic plan?

- A plan which addresses institutional size, number of faculty, curriculum, teaching and research issues?

- Do the changes that you envision for the sciences fit within that planning context in terms of numbers of faculty, staff, students, and curriculum?

- What are your institutional priorities?

Many times, planning for any discipline is done out of context of the larger vision of the college. Without question, the driving force—the defining force—in planning any improvements must be mission and academic plan. All decisions about people, program, curriculum, facility, and dollars must be rooted in this basic beginning point.

The mission statement and academic plan, are, in combination, the most important components of the planning process. The mission statement and academic plan are prepared by the institution to articulate its point of view regarding programs, services, class size, student-faculty ratio, staffing, facilities, and fiscal resources. Interestingly enough, the internal discussions and decisions required by the institution to develop the mission statement and academic plan are as essential as the statement themselves.

The admonition “don’t leave home without it” should be modified to “don’t start planning without it.”

One measure of success of a new science program or curriculum is an increase in enrollments. An exciting program in science and mathematics has been shown to increase majors in the sciences. If overall enrollments are kept constant, then increasing enrollments in the sciences is at the expense of other programs. If this is counter to the academic plan, then steps must be taken to balance enrollments.

One college, concerned by the imbalance of science majors to other majors, has decided to control the growth of science and mathematics majors by controlling the admissions process. Whether or not this is an appropriate tactic for your campus, be aware that success has a ripple effect throughout the institution. Be ready to recognize the ripples and to act in a positive way.

(One positive ripple can be seen at Dickinson College, where the excitement of Workshop Physics has overflowed into other departments. I understand that Math and Computer Science are exploring ways of implementing the workshop environment in their programs.)

The next set of questions deal with teaching, research, and student research.

- How do today's students learn? What works?

Mike Doyle asked the question "Who are the students whom we educate and where do they go?" A related question is "How do today's students learn?" A recent article in "Change" suggested that contemporary students learn differently. In the past, we learned the concept first and then the application. According to the article, today's students are more comfortable learning the application first, followed by an understanding of the concept. The article supports and underscores the importance of hands-on, experiential learning as a way of teaching; and suggests application beyond just science and mathematics programs.

We need to ask ourselves how we should modify the way we teach so as to improve on the way we were taught while, at the same time, adapting to current ideas and technology and institutional direction. What are the implications on curriculum, staffing, and facilities?

- To what extent have science faculty at your college explored changes in teaching style and methodology, such as Beloit's BioQuest, Bowdoin's micro-chemistry, Dickinson's lab based Physics curriculum, Duke's Project CALC, RPI's computer based calculus, and Holy Cross's discovery chemistry? What changes do you anticipate in teaching methodology?

It is important for faculty and staff to be knowledgeable about how other colleges are teaching, how other colleges have organized their science programs, and how other colleges are using space.

Often, science faculty are too busy with teaching, research, administrative duties, grant writing, and related activities to have a chance to see what is going on in science and mathematics departments at other colleges. It is easy to fall into a parochial view of the immediate world.

As Mike Doyle suggests in his remarks before these, a realistic reassessment of expectations of faculty is needed. The college should provide opportunities to broaden faculty knowledge about curriculum, teaching methodology, and facilities. One simple approach is to provide resources for faculty to visit other institutions. Tours of other colleges should not be done casually, in an ad hoc fashion, but formally, with written questions and responses, and perhaps photographs taken to show to colleagues. Ideally, this should be done periodically and certainly at the very beginning stages of any planning process.

Sometimes, inviting guests to your institution makes more sense. One college invited a number of college and university deans (some of whom were scientists themselves) to discuss trends and changes in the sciences.

Another college conducted a workshop (with a theme: “Where are the sciences going in the coming decade”) and invited college presidents, deans, foundation officers, planners, and architects to discuss the changes from their perspectives.

Don’t forget to educate your trustees as well, both in terms of the way in which you want to teach science and conduct research programs, and also in terms of facilities and the newer technologies available.

One college invited their trustees to a multimedia fair, in which a number of computer and multimedia vendors were invited to campus to show cutting-edge technology to both faculty and trustees. The sub rosa message to the trustees was that we’d like your support in gaining this exciting technology.

Another college had a trustee/faculty retreat designed to inform the trustees of new faculty programs, teaching, and research.

- To what extent does the college’s thinking about the sciences represent 4, 5, or 6 independent statements and visions of the future; rather than a coordinated, division-wide vision?
- Should all the science departments be treated equally, or does the college plan to nurture one department over another in order to strengthen a particular program?
- How are your college curriculum and your depart ments adapting to the blurring of the boundaries between the sciences today?
- Can facilities and programs be organized to encourage opportunities for multi-disciplinary activities?
- How can existing facilities support opportunities for new programs?
- Do you anticipate changes in your general college curriculum that will have spatial implications?
- Staffing implications? Financial implications?

For example, is your college planning a change in faculty loading or changes in requirements for graduation that might impact the sciences, such as a requirement for additional lab based credits? Will students be expected to be involved with research projects—a senior project for example?

The last set of questions relate to planning for improvements in terms of process, organization, and responsibilities.

- What is the role of the chief academic officer in the planning of science and mathematics facility and program improvements?

- Has your college's president, provost or dean, and development officer been involved in your planning process?

- What type of resources should the college make available to support faculty in their quest to develop the most exciting program, or the best facility?

John Millett has said that "The planning effectiveness of a campus depends on the planning effectiveness of its presidential leadership. There is no escape from this situation." Let me broaden this statement—any plan to improve science and mathematics must include the early participation and support of the president, provost, dean.

Does the college need additional upper level administrative staff to support these improvements? Should a Chief Information Officer of vice presidential rank be hired to coordinate all of the information technologies on the campus: academic and administrative computing, telephone, Libraries, classrooms, multimedia, and AV. Bowdoin College is doing just that: they will be hiring someone of this rank to coordinate all information technologies on campus.

Yogi Berra supposedly said "it's not over 'till it's over." But for science planning, "It's not over when it's over." If a new program is launched or new facilities are provided, there will need to be time and resources set aside for training faculty and staff in the new technologies, training for new software, and time for experimentation. In terms of a new program, there will need to be measurement, analysis, and assessment. Criteria will need to be developed to judge the efficacy of the new program to aid in modification and improvement. As no program is static, allowances must be made for continued modifications.

Colleges should think carefully about the need to provide release time for faculty to allow for experimentation and assessment. It is difficult to maintain a typical teaching and research load also find the time to develop a new curriculum or program. RPI provides staff support and space to experiment as an incentive to strengthen teaching and curricular improvements.

The development of new programs for the sciences is exciting—we are at a time when this is occurring both within the disciplines and within higher education. The process for change must be rational and rigorous. There are many questions you must ask at the beginning. The one question that you want to avoid asking is "why didn't we think of that before."

- Arthur J. Lidsky