



# Steps Toward Reform

Report on Project Kaleidoscope  
1997-1998

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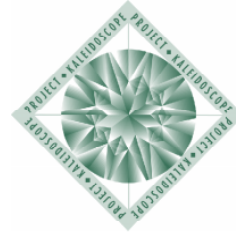
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Opinions expressed are those of the authors  
and not necessarily those of the Foundation

May 1999



Dear Colleagues:

On the following pages Project Kaleidoscope (PKAL) presents summaries of recommendations from some of the recent Keck/PKAL Consultant reports. These consultancies, supported by a grant from the W.M. Keck Foundation, have proved to be one of the most productive means to foster informed and continued steps toward reform within PKAL (See page 12 for a description of the Keck/PKAL Consultant Program).

We believe that colleges and universities across the country will find their own issues and concerns mirrored in the issues addressed in these reports. The institutions involved in this selection are quite diverse. The problems they faced were quite varied; the advice of the consultants is accordingly different for each situation and institution.

Common themes, however, do emerge from these and other materials in the PKAL National Office. We have chosen to highlight the insights from the Keck/PKAL consultancies in this Report on PKAL, 1997-1998. We hope the advice and recommendations summarized in this report can be adapted for use on your campus.

#### Steps Toward Reform:

- ◆ The first step toward reform is to start talking. Begin conversations about your goals for student learning and your vision for the future. These conversations may begin with PKAL teams, within departments, with divisional colleagues, but wherever they start, eventually they must include everyone at your institution who has a stake in reform.
- ◆ Deal head-on with differences. Differences are inevitable, and complete consensus at all times is not the only prescription for reform. Reaching some common ground, however, is an important step that will allow forward movement. As conversations based on a common understanding continue, the common ground will spread and grow.
- ◆ Deal head-on with the impediments to initiating interdisciplinary courses. Begin conversations to analyze and explore the governance roadblocks, and the intellectual and philosophical roadblocks, to programs that cross disciplinary lines.
- ◆ Find ways to collaborate with departmental colleagues and colleagues from other departments. Collaborations can lead to sharing resources and ideas, team teaching and new curricular initiatives.
- ◆ Find ways to use your institution's most precious resource: the faculty who do the teaching and the research in the most productive ways. Devise evaluative procedures that fit with your institution's agenda for reform and ensure that junior faculty are heard and mentored, and take the opportunity presented by new hiring to further your steps toward reform.
- ◆ Plan new facilities only when there is broad and detailed agreement on what the building is intended to achieve, what kind of education will be supported, and what faculty and students will be affected. Plan with administrators and trustees as partners, and plan what is feasible.
- ◆ Don't delay reform until facilities are adequate. There are a number of ways in which existing facilities may be modified to better accommodate changing research and teaching needs and shifting enrollments. This will help focus discussions on reform priorities, begin conversations about your vision for the future, and lay the essential groundwork for future facilities planning.

Sincerely,

A handwritten signature in black ink that reads "Jeanne L. Narum". The signature is written in a cursive, flowing style.

Jeanne L. Narum  
Director

# ❖ Start with a focus on student learning.

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## **Request:**

Advice and counsel at an early stage of facilities planning.

On this campus, the Keck/PKAL consultants recognized that the community had moved too quickly to consider new facilities. They recommended a significant ‘step-back’ from thinking about spaces and suggested that a first step in the process of successful facilities planning was to have a broad consensus on goals.

## **Recommendations:**

### ◆ **Develop clear departmental aims and objectives.**

Your faculty, within and between departments, do not yet have a common agreement about goals for student learning– on the particular outcomes of learning in individual courses or departments, and about how those outcomes serve larger institutional purposes.

### ◆ **Build communication networks that lead to collaborative efforts.**

There is an apparent lack of knowledge about ‘what works.’ Faculty do not know of the expertise, experience, and interests of those within their division or across campus; there is also no sense that faculty are aware of the work of colleagues on other campuses or are interested in adapting reforms initiated elsewhere. Collaborations can be cost-effective: they lead to sharing, team-teaching and taking advantage of the resource of colleagues right down the hall or at a nearby institution. They can also serve students in an era of increased interest in inter/cross-disciplinary programs.

### ◆ **Mentor new faculty, perhaps across departmental lines.**

This would be one step to getting the departments to talk and work together. Because of the lack of mentoring and the absence of departmental conversations about goals, new faculty have assumed undue responsibilities outside the department and have added new courses that are not central to your program.

### ◆ **Develop clear procedures for dialogue and communication, between and among faculty and the administration.**

The mixed signals being sent and the perception of ‘being-out-of-the loop’ makes it easy for faculty to pull away from serious, ongoing discussions about renewal of program and facilities. Too many faculty are constrained by a perception of fiscal stringencies and of dollar limits, a constraint that is limiting their vision. A new building will be most effective when faculty have been challenged to dream big and have a common vision of the future.

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Agnes Scott College ◆ Albion College ◆ Albright College ◆ Alfred University ◆ Alice Lloyd College ◆ Allegheny College ◆ Alma College ◆ American College of Thessaloniki ◆ Amherst College ◆ Antioch University ◆ Appalachian State University ◆ Aquinas College ◆ Ashland University ◆ Assumption College ◆ Augsburg College ◆ Augustana College ◆ Augustana College (IL) ◆ Aurora University ◆ Austin College ◆ Austin Community College ◆ Avila College ◆ Baker University ◆ Baldwin-Wallace College ◆ Ball State University ◆ Barat College ◆ Barber-Scotia College ◆ Barnard College ◆ Bates College ◆ Baylor University ◆ Bellarmine College ◆ Belmont University ◆ Beloit College ◆ Bemidji State University ◆ Benedict College ◆ Benedictine University (IL) ◆ Bennett College ◆ Berea College ◆ Berry College ◆ Bethany College (KS) ◆ Bethel College ◆ Biosphere 2 Center, Columbia University ◆ Birmingham-Southern College ◆ Black Hills State University ◆ Bloomsburg University ◆ Bluefield College ◆ Boston College ◆ Boston University ◆ Bowdoin College ◆ Bowie State University ◆ Bowling Green State University ◆ Bradley University ◆ Brown University ◆ Bryn Mawr College ◆ Bucknell University ◆ Buena Vista University ◆ Butler University ◆ CSU-Fullerton Mission Viejo Campus ◆ CUNY-Borough of Manhattan Community College ◆ CUNY-Bronx Community College ◆ CUNY-College of Staten Island ◆ CUNY-New

# Don't short-cut the process. ❖

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The consulting team also suggested that the administration take greater responsibility for getting the community to look long and hard at programmatic and institutional priorities in the context of facilities planning.

## ◆ Rethink policies and procedures that affect faculty productivity.

One of the mixed signals being sent concerns the value/role of research on your campus. New policies for promotion and tenure speak about research agendas that actively involve students, and new hires come with this understanding. However, the number and range of courses taught, the time spent setting up and tearing down labs, and the duplication of courses taught within and across departments reduces productivity and limits the time available for faculty to engage in research, reflection, collaboration, or other scholarly activities.

Understand that new pedagogical approaches (as they are developed and implemented) will make significant demands on faculty time and energy.

## ◆ Develop an institutional plan for technology.

Incorporating computers and other technologies into classrooms and labs is now being done at the level of individual faculty and departments. A carefully crafted institutional plan will identify the most effective way to secure, place, and maintain the necessary information technologies in the short- and long-term.

## ◆ Continue to engage the interest of trustees in planning, but do so realistically.

The involvement of trustee leaders has led to a greater sense of urgency, and thus to the accelerated timetable for the facilities project. Trustees as well as faculty must have both a vision and a realistic sense of what is possible and necessary.

## ◆ Take small steps now.

One goal of improved spaces is to make science visible, using display cases and bulletin boards in hallways and open spaces to accommodate photos, reports, artifacts, and other materials that illustrate the nature of science; another is to provide space for the talking and working together that is at the heart of the scientific process. Even a quick walk through your present building suggests ways to make minor adjustments that would facilitate both communication and community.

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York City Technical College ◆ California Lutheran University ◆ California Polytechnic Univ., San Luis Obispo ◆ California State Polytechnic University-Pomona ◆ California State University — Chico ◆ California State University San Bernardino ◆ California State University, Hayward ◆ California State University-Fresno ◆ California State University-Fullerton ◆ California State University-Long Beach ◆ California State University-Los Angeles ◆ California State University-Sacramento ◆ Calvin College ◆ Cameron University ◆ Campbellsville University ◆ Canisius College ◆ Capital University ◆ Carleton College ◆ Carlow College ◆ Carnegie Mellon University ◆ Carroll College (MT) ◆ Carroll College (WI) ◆ Carson-Newman College ◆ Case Western Reserve University ◆ Cedar Crest College ◆ Centenary College of Louisiana ◆ Central Arizona College-Superstition Mount, Campus ◆ Central College ◆ Central Connecticut State University ◆ Central Michigan University ◆ Central State University ◆ Central Washington University ◆ Centre College ◆ Chatham College ◆ Chattanooga State Technical Community College ◆ Chemeketa Community College ◆ Chicago State University ◆ Christian Brothers University ◆ City College of New York ◆ Clackamas Community College ◆ Claflin College ◆ Claremont McKenna College ◆ Clark Atlanta University ◆ Clark University ◆ Clemson University ◆ Cleveland State University

# ❖ Take small steps now.

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## **Request:**

Advice on how to survive in less-than-adequate facilities.

A university in the northeast recognized that new spaces for science were many years away and looked for advice on how to survive in the short-term in less-than-adequate facilities.

## **Recommendations:**

### ◆ **Make better use of existing spaces.**

A careful analysis of scheduled room use will reveal that some spaces are under-utilized. There should be an institutional policy about how spaces are used (shared, allocated and reallocated). Good stewardship of current spaces sets a pattern for planning for the future. Consider the impact of expanding biology enrollments in reallocating spaces; perhaps use inadequate and under-used research lab spaces as teaching labs.

Walk through the building; take a furniture-audit. Purge unused lab equipment from teaching spaces; remove all unused furniture currently stored in the hallways (this adds to the congested feeling). Spend a weekend moving matching chairs and tables into the same rooms (make it a class project).

Find niches on all floors where two chairs, a small desk, and a computer hookup can be placed. Find other spaces that can be used as student lounges, with tables, comfortable chairs, computer hookups, and perhaps even an espresso machine.

### ◆ **Bring current spaces up-to-code immediately.**

High priority should be given to renovating the animal holding space. Provide adequate ventilation with controlled temperatures, timers for adjusting light cycles, food and bedding storage areas, and a better clean-up space with an under-counter dishwasher. Replace old cages. All items containing wood or porous materials should be removed; walls and floors should be painted with a waterproof enamel that resists bacterial growth. Give high priority to storing hazardous chemicals, either in explosion-proof cabinets or by designating a storage room.

### ◆ **Plan for the future now.**

Make any furniture purchases with the future in mind. Chairs on wheels are essential in an environment that seeks to facilitate serendipity in learning.

Project needs of new faculty hires as your planning now takes place. Interview colleagues elsewhere doing research in areas where new hires will be made. In adapting current spaces for new hires, develop models of labs for the future.

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◆ Clinch Valley College ◆ Coastal Carolina University ◆ Coe College ◆ Colby College ◆ Colby-Sawyer College ◆ Colegio Universitario del Este ◆ Colgate University ◆ College Misericordia ◆ College of Charleston ◆ College of DuPage ◆ College of Lake County ◆ College of Mount St. Joseph ◆ College of New Rochelle ◆ College of Notre Dame of Maryland ◆ College of San Mateo ◆ College of St. Benedict ◆ College of St. Benedict, St. John's University ◆ College of St. Catherine ◆ College of St. Scholastica ◆ College of William and Mary ◆ College of Wooster ◆ College of the Holy Cross ◆ College of the Sequoias ◆ Colorado School of Mines ◆ Colorado State University ◆ Columbia College (SC) ◆ Columbia University ◆ Columbia University—Lamont-Doherty ◆ Columbus State University ◆ Community College of Philadelphia ◆ Concordia College ◆ Concordia University ◆ Connecticut College ◆ Coppin State College ◆ Cornell College ◆ Cornell University ◆ Cottey College ◆ Creighton University ◆ Culver-Stockton College ◆ Cumberland College ◆ Cypress College ◆ Dakota Wesleyan University ◆ Dartmouth College ◆ Davidson College ◆ Davis and Elkins College ◆ DePauw University ◆ Deakin University ◆ Denison University ◆ Dickinson College ◆ Dillard University ◆ Doane College ◆ Dordt College ◆ Drake University ◆ Drew University ◆ Drexel University ◆ Drury College ◆ Duke University ◆ Duke University

# Listen to the voices of all faculty. ❖

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## Recommendations:

### ◆ Consider the significance of new hires.

In the next five years, over 50% of the departmental faculty will be replaced, a challenge to be sure, but also a great opportunity to make a difference. To do this responsibly, the current departmental vision statement needs to be front and center in the hiring process. In written and oral interviews, determine how candidates reflect and respond to that vision, and how s/he would contribute to achieving that vision.

### ◆ Ensure that the voice of junior faculty is heard and respected.

Through mentoring and informal opportunities for sharing, make every effort to socialize these new faculty into the department and the broader campus community in an ongoing manner.

### ◆ Support junior faculty in visible ways.

Provide time and resources for new faculty to establish their research, by giving a reduced load, or by incorporating ‘research for credit’ into their teaching responsibilities. Provide opportunities to attend workshops addressing scholarly responsibilities and roles.

### ◆ Realize the value of a lean, lab-rich curriculum.

Follow through on plans to infuse more investigative learning into the curriculum, including more collaborative small group work and less didactic lecturing, thinking about more student-initiated work and less faculty-directed learning. Recognize the resources needed to implement such new approaches.

### ◆ Examine the relationship, scope and sequence of departmental offerings for majors.

Introductory courses should prepare students intentionally for courses that follow, and lead to a coherent education for majors. Work to eliminate redundancies; allow material covered in advanced courses to be streamlined and more highly focused (serving to make the department more effective and more efficient).

## Request:

Assistance with developing a departmental agenda for reform.

On this campus, the biology department was struggling to outline an agenda for reform that made sense in their institutional context, with a faculty that had good intentions about, but little experience with, departmental transformation.

# ❖ Identify points of conflict.

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## **Request:**

Help negotiate through departmental politics in a time of change.

Unlike the previous consultancy, on this campus the request was to work with a more dysfunctional department, one with different pockets of resistance, in which there was little interest beyond the PKAL team to considering new approaches. The consultants made recommendations considering the politics, as well as the process, of reform.

## **Recommendations:**

### ◆ **Start small. Begin with introductory courses.**

The shared nature of introductory courses can have a very positive effect on the process of change; if one member of the department tries a new approach, other faculty will at least be aware of it. Recognize that there is a great variety of approaches to introductory physics, and learning about these variants may make options that are acceptable to most of the department clearer; it may also empower more faculty to adapt.

A coordinated effort to have more successful introductory courses may be a first step leading to a more flexible curriculum. More one-on-one interactions to find out what motivates students, and more opportunities for work in lab and for gauging the excitement of student majors through a system of student tutor/mentors, can serve as a catalyst for thinking about reform.

### ◆ **Deal head-on with differences.**

There are now sharp disagreements on the merits of particular changes. While it is valuable to have total consensus and teamwork, that is not the only prescription for reform. Disagreements can be productive; they can provide creative tension and give opportunity for critical assessment of different approaches. We urge continued sharing, but caution against the paralysis that comes if there is too much pressure for consensus before any reform is undertaken. Since there is some consensus that something has to be done, get that consensus in writing to detail the common ground and use this as an endorsement for some faculty to move ahead now.

Recognize that success will depend on the enthusiasm and commitment of faculty involved. Do not force skeptical faculty into trying something about which they feel uncomfortable or lack confidence in implementing. The departmental curriculum is flexible enough to have a variety of approaches.

Be prepared for a rocky road the first time a new course is offered. Evaluate it carefully, as a department, but do not consider those evaluations in annual faculty reviews. (Remember that students sometimes have a hard time adjusting to new approaches!)

### ◆ **Have a departmental perspective on courses, and on the impact and sequence of departmental offerings.**

Think about the ownership of individual courses from a departmental perspective, not an individual one. The department might form teams that take responsibility for specific portions of the curriculum.

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◆ Grinnell College ◆ Gustavus Adolphus College ◆ Hamilton College ◆ Hamline University ◆ Hampshire College ◆ Hanover College ◆ Harry S. Truman College ◆ Hartwick College ◆ Harvard University ◆ Harvey Mudd College ◆ Haverford College ◆ Hawkeye Community College ◆ Hazard Community College ◆ Heald Colleges ◆ Heidelberg College ◆ Hendrix College ◆ Herbert Hoover High School ◆ Hiram College ◆ Hobart and William Smith Colleges ◆ Hollins University ◆ Hood College ◆ Hope College ◆ Howard University ◆ Huntington College ◆ Illinois College ◆ Illinois Mathematics and Science Academy ◆ Illinois Wesleyan University ◆ Indiana State University ◆ Indiana University Kokomo ◆ Indiana University at Bloomington ◆ Indiana University of Pennsylvania ◆ Indiana University-Purdue Univ. at Indianapolis ◆ Institute of Ecosystem Studies ◆ Iona College ◆ Ithaca City School District ◆ J. Sargeant Reynolds Community College ◆ Jacksonville University ◆ James Madison University ◆ John Carroll University ◆ John Muir Elementary School ◆ John Wood Community College ◆ Johnson C. Smith University ◆ Joliet Junior College ◆ Joliet Township High Schools ◆ Judson College ◆ Juniata College ◆ Kalamazoo College ◆ Kalamazoo Valley Community College ◆ Kansas State University ◆ Keene State College ◆ Kennesaw State University ◆ Kenyon College ◆ Keystone College ◆ King College ◆ King's College ◆ Knox

# Identify points of consensus. ❖

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Think also about the impact and sequence of departmental offerings. Document the points of attrition in the current program; consider where first to make changes to maximize the opportunity to recruit students and encourage persistence. Given the current high rate of attrition, the department should look carefully at the transition from high school and at the mathematical preparation of incoming students, a look that might lead to changes in prerequisites or in your advising.

Plan carefully and advertise broadly the intermediate and advanced courses, so that under-class students are comfortable with and excited about the intellectual and technical experiences that lie ahead for them.

## ◆ Have a departmental perspective on laboratory experiments.

It might be helpful to develop better documentation as to which experiments should be performed at different stages in the curriculum, as well as what resources are needed to perform each experiment. Preparing a flow chart will help both faculty and students see the relationship and sequence of the various experiments and the various options for experiments (set-piece, multi-week formatted experiences and open-ended projects). Discussing issues of common interest and concern is one approach to overcoming differences.

## ◆ Collaborate with colleagues in other departments.

To attract more students into the study of physics and to enlarge opportunities for them, discuss the potential of working with other departments to coordinate or share course offerings, perhaps by team teaching (with chemistry: thermodynamics, statistical/quantum mechanics; with biology, mathematics, or computer science: electronics, interfacing, computational methods).

## ◆ Develop a collective spirit.

To be most successful as a department, research and teaching activities of individual members need to have the tangible support of all members of the department, who should consider such efforts as a collective source of pride. Departmental responsibilities should be distributed as needed, and resources of money and time allocated in ways targeted to achieve common goals.

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College ◆ Kutztown University ◆ La Salle University ◆ La Sierra University ◆ Lafayette College ◆ Lake Forest College ◆ Lake Superior State University ◆ Lamar University ◆ Lander University ◆ Lane College ◆ Lane Community College ◆ Lawrence Technological University ◆ Lawrence University ◆ Lee University ◆ Lees College ◆ Lehigh University ◆ Lenoir-Rhyne College ◆ Lesley College ◆ Lewis and Clark College ◆ Lewis-Clark State College ◆ Lexington Community College ◆ Lima Technical College ◆ Lincoln University (MO) ◆ Lindsey Wilson College ◆ Linfield College ◆ Linn-Benton Community College ◆ Little Big Horn College ◆ Livingstone College ◆ Long Beach City College ◆ Longview Community College ◆ Los Alamos National Laboratory ◆ Los Angeles City College ◆ Louisiana State University (Baton Rouge) ◆ Louisiana State University at Shreveport ◆ Louisiana Tech University ◆ Loyola College-Maryland ◆ Loyola Marymount University ◆ Loyola University ◆ Loyola University of Chicago ◆ Luther College ◆ Lycoming College ◆ Lynchburg College ◆ Lyon College ◆ MacMurray College ◆ Macalester College ◆ Madison Area Technical College ◆ Madonna University ◆ Manchester College ◆ Marian College (WI) ◆ Marietta College ◆ Marist College ◆ Mars Hill College ◆ Mary Washington College ◆ Marygrove College ◆ Marymount University ◆ Maryville College ◆ Massachusetts Institute of Technology

# ❖ Link departmental and institutional goals.

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## **Request:**

Suggestions about how to sustain commitment to facilities planning.

One southern campus had been engaged in a 'fits and starts' approach to thinking about new spaces, and needed help in thinking about ways to maintain the current momentum.

## **Recommendations:**

### ◆ **Set a precise schedule for continued planning.**

After a long incubation period followed by a period of being 'on-hold,' the project is now back on track. The current commitment and energy of the faculty can only be sustained within the confines of a carefully-set and mutually agreed-upon timetable, and a clear sense from the administration of what the college can afford. The administration must collaborate with faculty by being open about a realistic budget for facilities renewal. If the current effort proves to be not feasible, it may be difficult to reinvigorate faculty for another planning effort in the future.

### ◆ **Connect planning for various capital projects to efforts to strengthen institutional distinctiveness.**

Do not underestimate the importance of a consensus on the nature of hall-mark programs and how they should be strengthened. Forge a consensus about priorities among proposed curricular initiatives. There seems to be a lack of clear communication between faculty and the administration about how to maintain strong programs, with the perceived 'business' mentality of the administrative approach seeming to be alien to some faculty.

In particular, come to some clarity about the number of interdisciplinary initiatives that are being discussed (formally and informally). Evaluate each one from the potential impact it would have on the total program in science, including the continued planning for new spaces, as well as the contribution it would have on institutional budgets and culture.

### ◆ **Recognize that faculty are not design professionals.**

The academic goals of the project, properly the province of the science faculty and administration, may be achieved by a number of architectural approaches. The design of said approaches is properly the province of the architects and engineers with whom the college will contract. For example, several faculty are convinced that interdepartmental collaboration can only be achieved by housing all faculty under one roof. Experience on other campuses suggests that promoting such collaborations can be achieved in ways that might be more cost-effective than the single-building solution. The faculty planners should not attempt or assume particular building solutions.

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◆ McGill University ◆ McHenry County College ◆ McMurry University ◆ McPherson College ◆ Meredith College ◆ Mesa Community College ◆ Miami University ◆ Miami University Hamilton ◆ Middle Tennessee State University ◆ Middlebury College ◆ Miles College ◆ Millikin University ◆ Mills College ◆ Millsaps College ◆ Mississippi State University ◆ Mississippi Valley State University ◆ Missouri Western State College ◆ Modesto Junior College ◆ Monmouth College ◆ Monroe Community College ◆ Montana State University ◆ Montana Tech of the University of Montana ◆ Montclair State University ◆ Moorhead State University ◆ Moravian College ◆ Morehouse College ◆ Morgan State University ◆ Morningside College ◆ Morris Brown College ◆ Morris College ◆ Mount Holyoke College ◆ Mount Mary College ◆ Mount Mercy College ◆ Mount Saint Mary College-New York ◆ Mount Saint Mary's College (CA) ◆ Mount Saint Mary's College and Seminary ◆ Mount Senario College ◆ Mount Union College ◆ Mount Vernon Nazarene College ◆ Mt. Hood Community College ◆ Mt. San Antonio College ◆ Muskingum College ◆ Nazareth College of Rochester ◆ Nebraska Wesleyan University ◆ New College of the University of South Florida ◆ New Jersey City University ◆ New Jersey Institute of Technology ◆ New Mexico Highlands University ◆ New Mexico Institute of Mining and Technology ◆ New School for Social Research

# Be persistent in making your case. ❖

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## Recommendations:

### ◆ Document the cost of renovation/expansion of existing facilities.

A thorough review of existing facilities by architectural and engineering consultants will produce a cost comparison against projections for new construction that will serve two purposes. First, it will remove any doubt as to which solution is most cost-effective. The age of the buildings and the state of the services suggest that renovations will be costly; but how will it compare to new construction?

The second purpose for such a review is to strengthen the argument for funding. Renovation that is as costly as new is no bargain. A careful review will help fold science planning into the institutional master plan, by honing in on the minimal dollars needed to effect the desired upgrading of the mathematics and sciences programs.

### ◆ Make the broader case about the state-wide impact of an investment.

The sciences play a critical role in the economy of your state, and in the quality of life of your citizens. You can demonstrate the multitude of ways your program serves your state by identifying and quantifying the ways in which your graduates make a difference. Find out how many graduates are teaching in elementary and secondary schools across the state and how many of them are teaching mathematics or science. Determine the number of graduates in the health professions, in regional hi-tech companies. Make the case that your science program has an impact on the everyday life of citizens in all parts of the state.

## Request:

Advice on how to make the case for a major investment in facilities.

In the context of beginning to think about new facilities, one state university asked for help in thinking through how to make the case for the value of the investment.

# ❖ Address structural barriers to reform.

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## Request:

Advice on getting interdisciplinary programs established on a campus with a history of strong departments.

The challenge on this campus was a lack of trust between departments, and between faculty and administrators, in the context of initiating programs that crossed the traditional departmental boundaries.

## Recommendations:

- ◆ **Develop clear and consistent college-wide policies, procedures and standards for setting expectations of faculty members for participation in interdisciplinary programs.**

The rationale for this recommendation is that the existing situation exposes faculty, especially junior faculty, to expectations that are developed, conveyed, and enforced independently of the structures that define the regular academic governance of the College.

- ◆ **Develop and adopt a clear and consistent pattern to govern the formation, maturation, and resource allocation for interdisciplinary programs.**

The rationale for this recommendation is that the existing system, with interdisciplinary programs under the governance of committees appointed by the general faculty committee on committees, weakens their standing as academic units, and contributes to the current difficulty of sorting through personnel and curricular issues. Also review the pattern of resource allocation across departments and interdisciplinary programs; there is a reality that even the assignment of support staff sends a signal about organizational commitments.

- ◆ **Have college-wide discussions on the meaning of ‘interdisciplinary.’**

There appears to be a pervasive disconnect between the administrative expectations and definitions of interdisciplinary programs and those of faculty. Given the recognized need for faculty ownership of new programs, arrived at through careful deliberations, we recommend that an extended dialogue on the concept of interdisciplinary studies should begin and should be continued through the season in which issues of governance and expectation are being resolved. These conversations should deal with both the philosophy and the value of such program, and should be facilitated by a well-respected faculty member— someone with significant institutional memory.

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◆Punahou School ◆ Purdue University ◆ Purdue University North Central Campus ◆ Purdue University—Calumet ◆ Radford University ◆ Ramapo College of New Jersey ◆ Randolph-Macon College ◆ Randolph-Macon Women’s College ◆ Raritan Valley Community College ◆ Reed College ◆ Regis College ◆ Regis University ◆ Rensselaer Polytechnic Institute ◆ Rice University ◆ Richard Stockton College of New Jersey ◆ Richland Community College ◆ Ripon College ◆ Roanoke College ◆ Rochester Institute of Technology ◆ Rock Valley College ◆ Rockford College ◆ Rockhurst College ◆ Roosevelt University ◆ Rowan University ◆ Russell Sage College ◆ Rust College ◆ Rutgers University Busch Campus ◆ Rutgers University-Douglass College ◆ SUNY - Albany ◆ SUNY - Binghamton ◆ SUNY - Cortland ◆ SUNY - New Paltz ◆ SUNY - Stony Brook ◆ SUNY-College at Fredonia ◆ SUNY-College at Oswego ◆ SUNY-Farmingdale ◆ Saint Anselm College ◆ Saint Francis College (PA) ◆ Saint Joseph College ◆ Saint Joseph’s College ◆ Saint Joseph’s University (PA) ◆ Saint Mary’s University of Minnesota ◆ Saint Mary-of-the-Woods College ◆ Saint Norbert College ◆ Saint Paul’s College ◆ Saint Xavier University ◆ Salem-Teikyo University ◆ Salisbury State University ◆ Salish Kootenai College ◆ Samford University ◆ San Diego Community College District ◆ San Diego Miramar College ◆ San Diego State University ◆ San Francisco

If you are already involved with PKAL, we hope this report sparks new thoughts about making changes at the campus level and about the why and how of reform at the national level. If this is your introduction to PKAL, we hope you see here ways to link your interest in transforming undergraduate SME&T to ours.

As you read this report, reflect on the changing context for our collective endeavors as we move into the next century. Could we have imagined:

- ◆ in the mid-1980's that institution-wide reform of SME&T would become a major theme in undergraduate communities across the nation?
- ◆ a decade ago that the changing role of the teacher/scholar would be the focal point of discussions on campuses, within disciplinary societies, or in funding agencies?
- ◆ the extent of collaborative efforts underway at the end of the 20th century, when individual agents of change started their work in isolated departments?
- ◆ the shift from a primary focus on majors to a concern that all students leave our campuses with a firm grasp of the scientific way of knowing, numerically literate, and understanding the role and impact of science and technology in our world today?

There are many reasons for these contextual changes. They respond to new directions in the practice of science and emerging understanding about the nature of learning; they reflect an awareness of the impact of technology in classroom and lab. But at the bottom line, the driving force in most successful efforts toward reform is a passion to spark the curiosity of students, to bring them to a clearer understanding of the natural and the built worlds, so they can connect their study of science and mathematics to other fields of inquiry during their undergraduate years and to their workaday world when they leave our campuses.

Can we imagine the future? Can we invent it? How will our current efforts sustain and build upon the momentum toward transforming the learning environment for all students? Those are questions now being asked within PKAL as we move into our 10th anniversary year. We invite you to join us in addressing them.

# ❖ About Project Kaleidoscope

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Project Kaleidoscope began in 1989 with support from the National Science Foundation. Then, as now, our charge was to identify and put the spotlight on successful efforts to transform the learning environment for students, and to build national networks working together toward that end.

## About PKAL Workshops

One way to describe PKAL is as *intelligence-broker*; another could be *network-builder*. PKAL workshops are one central venue for the exchange of ideas and materials about the work of individuals and institutions having documented success in strengthening student interest and success in mathematics and the various fields of science. Workshops are also a step in the process of building an informed cadre of agents of change at the local level, as well as the national level.

Participants in PKAL workshops are expected to reflect on their current circumstances in preparation for the workshop weekend. During the workshop, they analyze lessons learned from the sessions and outline a three/four-step action agenda to implement upon return to campus. These agendas are presented in the final session, and reported through the PKAL Web Site. The most frequently mentioned 'lesson learned' from the workshops is that *change takes time!* Since 1992, over 700 colleges and universities from across the country have sent teams to one or more PKAL Workshop.

## About the Keck/PKAL Consultant Program

One important outcome of the past decade of reform is to validate the premise that reforms proceed more purposefully and are more visionary when there are ongoing discussions—discussions that involve colleagues from within the divisions, as well as from arts, humanities, social sciences and from professional schools. The impact of broader local discussions is illustrated by the

changing tenor of applications to PKAL workshops: increasingly they speak about the need to revisit departmental programs in the context of new curricular requirements.

As discussions begin to involve colleagues from beyond the campus, they also reduce the possibility of 'reinventing the wheel,' which can slow the momentum toward reshaping programs and policies in the direction of institutional change. Nearly 100 colleges and universities are involved with Keck/PKAL consultancies. Recommendations for these institutions suggest ways for others to think about their planning for reform.

## About the PKAL Core Institution Program

Reform takes time, particularly when it is aimed at the entire institution. The success of scaling-up isolated efforts undertaken by individual faculty in individual departments is hard-won and not as frequent as we might like. Yet, a growing number of colleges and universities are building significant track records in taking reform seriously.

With support from the Fund for the Improvement of Postsecondary Education (FIPSE), PKAL is working to document *what works* in the process of scaling-up and institutionalizing reforms. This project involves a select group of nearly forty Core Institutions identified through their participation in PKAL. Each has a track record in getting community support—intellectual as well as financial—for making science and mathematics more integral to the educational experience of all undergraduate students. Considering departmental mission statements is one element of the *Core Institution Project*.

## About the PKAL Committee of Visitors

With support from the Office of Scientific and Technological Infrastructure at NSF, PKAL sponsored a year-long study of the impact of improved spaces on the community. A PKAL Committee of Visitors (COV) visited eight colleges and universities that represent the diversity of higher education in this country, institutions that are taking seriously the challenge to transform the environment for learning. Based on their analysis of materials gathered in the site visits, tours of new spaces, and interviews with students, faculty and administrators, the COV made recommendations in a report published in 1998, entitled *What Difference Do Improved Facilities Make?*

## About PKAL Faculty for the 21<sup>st</sup> Century

An operating premise of PKAL is that quality undergraduate SME&T education derives from faculty who are intellectually vigorous, up-to-date in their field, passionate about student learning, experienced with new technologies and pedagogies and with research on learning. We also believe that significant reform requires a tangible institutional culture in which the considerable effort required by change is recognized and rewarded. The workshops sponsored by PKAL are one means toward developing such institutional cultures.

Thus, to sustain programmatic reform locally and to encourage collaborative efforts nationally, faculty need to be involved in the same kind of intellectual community of change agents that characterizes the community of research scholars. With support from the Exxon Education Foundation, PKAL is building a national network of Faculty for the 21<sup>st</sup> Century, individuals identified by their deans as demonstrating potential for academic leadership.

In PKAL F21 National Assemblies and conversations, PKAL F21 members add to

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◆ Temple University ◆ Tennessee State University ◆ Texas A & M University ◆ Texas A & M University-Corpus Christi ◆ Texas College ◆ Texas Lutheran University ◆ Texas Wesleyan University ◆ The Catamount Institute ◆ The Claremont Colleges ◆ The Colorado College ◆ Toledo Hospital ◆ Tougaloo College ◆ Towson University ◆ Transylvania University ◆ Trinity Christian College ◆ Trinity College (CT) ◆ Trinity College (DC) ◆ Trinity College of Vermont ◆ Trinity University ◆ Troy State University in Montgomery ◆ Truman State University ◆ Tulane University ◆ Tuskegee University ◆ UCLA, School of Arts and Architecture ◆ Union College ◆ Union College (KY) ◆ United States Air Force Academy ◆ Universidad Metropolitana ◆ Universidade de Sao Paulo ◆ University of Akron ◆ University of Alabama ◆ University of Alabama at Birmingham ◆ University of Alaska Anchorage ◆ University of Arizona ◆ University of Arizona—International Campus ◆ University of Arkansas ◆ University of Arkansas Main Campus ◆ University of Arkansas at Pine Bluff ◆ University of California Medical Center ◆ University of California, Berkeley ◆ University of California, Davis ◆ University of California, Irvine ◆ University of California, Los Angeles ◆ University of California, Riverside ◆ University of California, San Diego ◆ University of California, Santa Cruz ◆ University of Canberra ◆ University of Central Arkansas ◆ University

# About Project Kaleidoscope ❖

their repertoire of understandings about leadership in the work of reform.

## About PKAL Leadership Activities

Encouraging and supporting those taking the lead in reforms at both the campus level and the national level is a central objective of all PKAL activities. In some workshops, discussions center around the role of department chair; in others the focus is on maintaining some sense of personal sanity. For a select group of PKAL F21 members, PKAL sponsors week-long Leadership Institutes. These retreats, supported by a grant from the Directorate of Biological Sciences at NSF, are a time for personal reflection and for setting priorities and developing an agenda for action for their professional future.

## About the PKAL Day of Dialogue on Shaping the Future

In December 1997, PKAL hosted a *Day of Dialogue: Shaping the Future of Undergraduate Science, Mathematics, Engineering, and Technology* at the National Academy of Sciences. A special feature of this *Day of Dialogue* on the NSF *Shaping* report was the involvement of representatives of national educational associations and disciplinary societies. A subset of this group has continued to develop plans for more collaborative (and more effective) actions to serve the larger undergraduate community.

## About PKAL's 10th Anniversary

During the weekend of October 22 - 24, 1999, PKAL will host a gathering of faculty, deans and presidents, and representatives of public and private agencies that support undergraduate SME&T. This will be an opportunity for colleagues from across the country to come together to celebrate some of the achievements of the past decade of reform, as well as a time to explore opportunities for collaborating in the ongoing effort

to build and sustain strong programs in mathematics, engineering and the various fields of science in the coming decade.

## About PKAL Publications

Materials prepared for and emerging from PKAL workshops and other activities are captured for distribution to the larger community in print and electronic form. In the past year, PKAL publications have reported on the *Day of Dialogue*, on the workshop on *Neuroscience* at Davidson College, and on the *Committee of Visitors Project*. With support from The Camille and Henry Dreyfus Foundation, Inc. a publication on undergraduate chemistry is being prepared. This, and a Supplement to PKAL *Volume III: Structures for Science* will be available later this year. These and other materials are available on the PKAL Web Site (<http://www.pkal.org>).

## PKAL Keystone Institutes



Beginning in the summer of 2000, PKAL will sponsor annual institutes on undergraduate SME&T at the Keystone, Colorado Conference Center. These *PKAL Keystone Institutes*, to be held during the last two weeks of July, will be an opportunity to continue and expand the dialogue about strengthening undergraduate programs evolving from PKAL workshops and the 10<sup>th</sup> Anniversary event.

The first Keystone week will focus on departmental issues, capturing sessions from the current generation of workshops, including: setting departmental goals for student learning; designing introductory courses; accommodating non-majors; developing interdisciplinary programs; incorporating new technologies and new pedagogies; and connecting to the K-12 community. In the second week, the focus will be on broader institutional issues: policies and procedures for faculty evaluation and reward, resource allocation, assessment, etc. Facilities planning and making the case about how a strong undergraduate SME&T community serves the national interest will also be addressed.

The intent is to offer two 3-day workshops each week for 250 participants each, with institutional teams choosing to participate in one or both of the workshops in a single week. Accommodations will be available for family and friends of participants, and the schedule will be planned to take some advantage of the pleasures of the Keystone area.

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## Key

- ◆ = UFE Workshop Presenter
- ❖ = National Issues Task Force
- = F21 '98 Steering Committee
- = F21 '98 National Assembly Host Site Committee
- = Keck/PKAL Consultant
- = F21 Keck/PKAL Consultant Observer
- ❖ = Core Institution Liaison
- ★ = Committee of Visitors
- ☆ = COV Institution Liaison
- ▼ = Dreyfus Writer

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Project Kaleidoscope (PKAL) is an informal alliance of individuals and institutions engaged in the work of transforming undergraduate programs in science, mathematics, engineering, and technology.

Since its beginning in 1989 with support from the National Science Foundation, the work of PKAL has been kaleidoscopic, giving attention to all aspects of the undergraduate SME&T environment— faculty, curriculum, facilities, as well as to larger institutional and national issues. From an initial base of primarily liberal arts colleges, colleagues and partners from other kinds of institutions— public and private, large and small— have joined in the work of getting science education right. Since Phase II began in 1992, nearly 4000 individuals from over 700 colleges and universities have participated in one or more PKAL activity. Phase III began in 1998.

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## *What Works*



The premise of Project Kaleidoscope is that what works in attracting students to the study of science and mathematics is a thriving natural science community. We believe this occurs where:

- ♣ learning is collaborative and steeped in investigation from the very first courses for all students through capstone courses for majors in mathematics and the various fields of science
- ♣ faculty are committed equally to undergraduate teaching and to their own research
- ♣ all students are expected to succeed
- ♣ there is active and visible institutional support for such a community, with a shared vision of **what works**.



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