

**Villa Julie College**  
**Project Kaleidoscope Inquiry Task Force**  
**Case Study Institution**  
**Fall 2006**

**SECTION 1: WHAT PROGRESS, IF ANY, TOWARD INSTITUTIONAL TRANSFORMATION WAS MADE PRIOR TO INVOLVEMENT IN THE PKAL LI INITIATIVE?**

From the onset of the 21<sup>st</sup> century Villa Julie College has been on a transformational pathway; indeed, “transformation” was the official theme of the 2004-05 academic year and, in varied forms of expression, has remained at the center of the College’s consciousness. Transformation in fact is characteristic of every fundamental dimension of the College culture from its leadership to its facilities to the faculty and the students. Among a long list of transformational indicators the following have emerged as most central:

**1) LEADERSHIP CHANGE**

In 2000, Dr. Kevin Manning, whose background is in enrollment management and fund-raising, assumed the presidency of the College, replacing the former nun who had led the school for 35 years dating back to the era when it was affiliated with a Roman Catholic religious order. Two years later, a new dean assumed the helm over the academic program. One of the ideas he brought in was the potential for joining PKAL because of his experience as the academic vice president of another college that had benefited from that affiliation. The new administration also brought a new academic structure featuring six divisions with directors supervising some seventeen departments. This new approach replaced an extremely flat organizational style and has been useful in prompting academic initiative and accountability while dispersing authority more broadly. Likewise, the college had no official faculty governance system prior to 2002 when a representative body (the Faculty Council) gained responsibilities for curriculum development, general academic policies, and matters related to faculty welfare.

**2) FACILITIES GROWTH**

The traditional campus of Villa Julie College is located in an isolated, prestigious residential area of Baltimore County. Not counting a few converted structures that remain from the original estate, this campus has only four buildings – an academic center/fine arts facility, a library/administration building, a gymnasium/student life building, and a general classroom/science lab center. Most of the facilities were constructed or renovated in 1997, so they are modern and serviceable, but stringent zoning regulations at this site prohibit additional construction and even cap enrollment at a headcount of 2500. Also relevant to this discussion is the fact that, until recently, the College owned no housing units for students and enrolled only commuters.

The new administration addressed these limitations by launching a construction blitz seven miles away in Owings Mills. On this new site, apartments and suites have the capacity to hold about 1400 residents, and additional facilities recently opened including an athletics-wellness-classroom facility in the former headquarters of the Baltimore Ravens football team, a new dining hall/student life building, and an additional administration and classroom facility where the School of Graduate and Professional Studies (which began in 2001) hosts its evening/weekend adult-focused programs. The two campuses are connected by a College shuttle service.

### 3) ACADEMIC PROGRAM

The historic mission of the College centers on providing a career-focused education. Every program has a major with an applied dimension. Only a small number of degrees had been developed prior to the year 2000, including paralegal studies, medical laboratory technology, nursing, elementary education, computer information services, business, visual communication design, and film-video-theater. Fledgling science degrees had been created, but they had few majors.

From this foundation, additional degrees emerged at the baccalaureate level and the associate degrees were discontinued in a gradual manner starting just before the college joined PKAL. Under President Manning, the career focus took on a new mantra known as *Career Architecture<sup>SM</sup>* with a greatly expanded career services unit to assist students in fulfilling the slogan "Imagine your future. Design your career." The College also expanded its historic commitment to experiential learning in the form of internships and a co-op program. With a faculty governance system in place, systematic procedures came into being for program and curriculum development.

### 4) ENROLLMENT AND FACULTY GROWTH

The full-time enrollment has grown by an average rate of 7.5% a year since 1997. Generally speaking, this rising tide has lifted most academic programs rather evenly, but prior to joining PKAL the major beneficiaries were in the applied fine arts and computer systems areas. The sciences kept pace but did not enjoy a noticeable spurt in enrollment. Historically, the College was a quasi-open admissions institution and the level of student preparation for college-level work tended to be below average. By 2002, the student body was at least average in terms of high school grades and entrance exam scores. Faculty credentials were more behind as measured by such indicators as the percentage holding terminal degrees, which stood at 58% in 2002. Faculty recruitment had always been local, salaries were average at best, and benefits were even more marginal as evidenced by the College retirement contribution of only 2% prior to 2000. All of these indicators showed signs of improvement before PKAL, but there was a lack of clear direction, at least until 2002.

## 5) SYSTEMATIC IMPROVEMENT GOALS AS ADDRESSED BY THE INITIAL PKAL APPLICATION

The individuals represented on Villa Julie College's PKAL Leadership Team each played a role in institutional transformation prior to becoming involved in PKAL, though the focus at that time was more on bringing a sense of academic legitimacy than on any clearly-articulated goal of reform. Examples of early transformational activities are articulated below for the Science and Mathematics Division.

- A vision statement was written.
- An assessment committee was formed.
- Goals and objectives for each major were articulated.
- A freshman seminar for science majors was developed.
- *Career Architecture<sup>SM</sup>* initiatives were pursued and later enhanced by an external grant from the Verizon Foundation.
- A "web presence" was established for the Division.
- A resource booklet for students was written.
- Performance standards for students were established.
- A "Supplemental Instruction" program for core science courses was piloted.
- A system for program review was initiated.
- Membership in CUR was established.

## SECTION 2: WHAT ARE THE VISION AND SIGNS OF SUCCESS?

### **Current Vision Statement:**

The Science and Mathematics Division will make research the foundation of a creative synergy between students and faculty that will enhance student learning.

We have defined what our vision means for our students:

- Students will engage in inquiry-based, active learning projects beginning in their freshman year.
- Students will build a strong foundation in the concepts and methods of science and mathematics.
- Students will learn to work in teams, building relational skills in addition to intellectual acumen.
- Students will develop effective oral and written communication skills.
- Students will conduct themselves in a professional and ethical manner.
- Students will complete a senior capstone experience that requires them to integrate the knowledge, laboratory skills, problem solving skills, and critical thinking abilities acquired during their undergraduate experience.

(a) Please provide the rationale and process through which you moved from the original vision to the present vision. How has reshaping your vision moved institutional transformation forward?

In responding to the application, team members crafted a “vision statement” that articulated a list of the elements we felt would be signs of our success in creating a research-rich learning environment on our campus. At the Hope College leadership workshop in 2005, one of our facilitators asked us to “paint a picture” of what our programs would look like if we succeeded in creating this research rich environment. In considering the question, a new vision statement emerged. This vision statement went beyond articulating specific goals and has become a guiding principle for all of the Division’s activities. It has given more focus to our ongoing efforts to infuse our curricula with inquiry-based learning and research at all levels.

We have integrated our vision into the culture of our Division in various ways. In 2004, we established a fledgling summer research program, funded by the College, under which one newly hired faculty member and two students from the Department of Chemistry and Physical Sciences conducted research over the summer. The following summer, the Summer Science Scholars Research Program (S<sup>3</sup>RP) grew to include one faculty member and two students from the Department of Biological Sciences in addition to those from Chemistry. This past summer (2006) we added an additional two students as Summer Research Assistants, and one student enrolled in research for academic credit, for a total of two faculty and seven students involved in summer research.

In the fall of 2006, our Office of Research Development became operational – it was funded by a grant from the National Institutes of Health, National Institute for Child Health and Development (NIH/NICHD/EARDA (#1 G11 HD051258-01). In addition to providing seed grant money for faculty engaged in research with students, this office will assist faculty in identifying potential extramural funding opportunities and in the preparation of grant proposals.

Over the last few years, each of the Departments in the Division has incorporated more project-based and research oriented exercises into the curriculum. This practice has greatly enhanced student learning, and each year, additional faculty members modify their courses to include these types of experiences.

We have also integrated our vision into the culture of the Division by including it in every official publication, such as the student guidebook and admissions brochures. Further, in our advising sessions with students each semester, faculty members discuss many research opportunities with students and encourage their participation in research projects. This emphasis on research became especially apparent during the current semester, when we presented a freshmen seminar module entitled “What’s Happening in the Science and Mathematics Division?” We used this hour to introduce the freshmen to our vision and to encourage them to include research in their education.

This fall, we have started a new monthly Speakers Series. Each month, a Department or program in the Division invites an outside speaker to present his/her research to faculty and students. With time for informal discussion as well as structured presentation time, this Speaker Series is intended to build the community of science at Villa Julie College.

**(b) How widespread is your vision across campus?**

Our vision is intentionally narrow in that it specifically refers only to the Science and Mathematics Division. Our plan from the inception of our association with Project Kaleidoscope was to start with changes in our Division, and thereby to serve as an inspiration for change throughout the rest of the institution. Believing that success begets success, our goal is to lead by example. We have made extensive changes in our Division relating specifically to our vision of a research-rich learning environment, and we are beginning to see these or similar changes taking hold in many other areas of campus.

For example, a faculty-led ad hoc task force on “Learning Beyond” has been created to explore ways to spread experiential learning throughout all academic programs. This group’s focus is on service learning and student engagement in cultural activities outside the classroom. At this point, the proposed model is to make Learning Beyond so ubiquitous that formal curricular requirements are unnecessary.

Many of the changes in our Division and at the College were getting underway either before or simultaneously with our involvement in PKAL. Our participation in PKAL has exposed the team to an array of models that work and enabled us to bring fresh perspectives to campus conversations on varied issues and initiatives that impact student learning.

**(c) Please describe activities that promote engagement of the entire campus with the vision including stories of how involvement of other people has reshaped the vision.**

Just prior to our involvement in PKAL, the College began a cycle of program reviews, the first of which was undertaken by our Department of Biological Sciences (“Biology Department”). As a result of that program review, several changes to the biology curriculum were suggested, including a complete revision of the introductory course sequence to incorporate inquiry-based learning. In addition to revising the introductory sequence, the Biology Department began actively seeking and applying for funding opportunities in support of curriculum revision. The Department of Chemistry and Physical Sciences (“Chemistry Department”) has also become involved in grant writing activities related to curriculum development, in collaboration with other local institutions. Both the Chemistry Department and the Department of Mathematics have undergone program reviews in the last year and are currently working on extensive revisions to their curricula that will incorporate more research experiences and opportunities at all

levels. Curricular reforms in the Science and Mathematics Division will continue to benefit the entire campus, as many science and math courses are offered to students who are majoring in other disciplines.

Throughout the College, divisions and departments are creating or expanding experiential learning opportunities for all students. These experiences have expanded to include not only the traditional senior research capstones, internships and field experiences, but also service learning opportunities, study abroad and other types of research experiences, such as sophomore and junior level research courses and summer research programs. As a result, increasing numbers of students are attending and presenting their work at local, regional, and national professional meetings. In addition to experiences for students, the College has expanded its Professional Development Grants program to support faculty research, which has enabled faculty from all areas of the College to pursue various forms of scholarly activity.

This year, the College received an NIH NICHD EARDA grant (#1 G11 HD051258-01) to establish an Office of Research Development, which is being administered by leaders of the Science and Mathematics Division, three of whom are PKAL Leadership Team members (Durmowicz, Gorman, Roskes). Two major goals of this award are to foster faculty-student research and to encourage grant-writing by faculty via seed grant funding. These seed grants are open to faculty in all departments of the College, and information on this opportunity has been disseminated campus wide. There have been a number of inquiries from faculty outside of the natural sciences, an indicator which we consider to be a sign of a broader and growing faculty base of interest in pursuing research.

As the Science and Mathematics Division has gone about encouraging more faculty-student research, extensive discussions of faculty roles and responsibilities have emerged. In conjunction with the faculty governance system, these discussions are being held in all divisions of the College, and new discipline-specific definitions are emerging that will pave the way for the creative and effective implementation of initiatives across campus to enhance student learning.

In many ways, the addition of a new team member, Susan Slattery, the Chair of the Department of Mathematics, has brought new dimensions to our vision and goals. Susan and her Department have reached out to the rest of the campus and proposed new quantitative literacy standards that will improve the math skills of all students. In addition, she has extensive experience in outreach activities targeting local area school children, and this fall we have become involved in a community-based robotics competition. Most recently, Susan has agreed to provide the oversight and direction for our Summer Science Camp program, whose founding leader left Villa Julie College in August 2006 to pursue a Ph.D. degree in toxicology.

Science faculty were among the first to team up with colleagues in other disciplines (as disparate as art and physics or biology and history) to teach interdisciplinary honors seminar courses, and have continued to be a driving force in the College's Honors Program.

Through the leadership of Carol Schmidhauser, a PKAL Leadership Team member, the Faculty Council recently adopted a set of learning objectives for the General Education program. (See Section 4e.)

With encouragement from the dean (a PKAL Leadership Team member) an ad hoc group of faculty and administrators have begun deliberations on extending and enhancing experiential learning opportunities for students. Under the general mantra of "Learning Beyond" the classroom, this group focuses on all forms of experiential learning – research, internships, practicums, clinicals, service learning, and cultural engagements. The approach is to integrate such experiences so fully into the curriculum that every student will benefit.

A recent presentation by Dr. George Kuhn, founder of the National Survey of Student Engagement (NSSE), demonstrates the power of engaging students and the potential for this approach to provide immense growth in learning outcomes, especially for students who begin college with lesser levels of preparation.

Dr. Kuhn compared the Villa Julie College student population to national norms and demonstrated that our students are engaged at generally high levels despite reflecting two characteristics – a high percentage of students who commute and work off campus – that usually result in lower levels of engagement.

(d) To what extent do members of the team think their individual commitments and passions are reflected in the vision?

The members of the team remain strongly committed to the vision and the goals it entails. Attendance at PKAL leadership workshops has reinvigorated each team member and reinforced our commitment. The focus of PKAL on "what works" has enabled us to come to the table with practical plans for new initiatives and the revision or reinvention of previous activities. Specific initiatives have evolved and grown in number, often inspired by ideas gained at PKAL events.

(e) What is the relationship of the vision to the institutional mission?

**Villa Julie College Mission Statement:**

*Villa Julie College provides a distinctive career-focused and personalized environment for undergraduate, pre-professional, and graduate students. The cornerstone of the mission is an educational experience to engage students in their personal, social, and intellectual growth by identifying and supporting career planning while encompassing liberal arts, science, and technology. The College encourages and supports a learning atmosphere based on core values, knowledge of its students and the practicality of broadening students' horizons for adapting to the changing world in which we live.*

**Division's Vision Statement:**

*The Science and Mathematics Division will make research the foundation of a creative synergy between students and faculty that will enhance student learning.*

The current vision for the Science and Mathematics Division dovetails quite nicely with the College's mission of providing a career-focused, personalized liberal arts education. Perhaps the most obvious connection between the Division's vision and the College's mission is the emphasis on experiential learning in all of its forms. For the PKAL Leadership Team, the value of a research-rich learning environment is in the opportunity for students and faculty to develop strong relationships and to "learn by doing." The Division's vision implicitly celebrates the transformative role that faculty members play when taking on the role of mentor to students.

(f) What are your goals for translating your vision to reality?

We have begun many initiatives in the last two years and expanded or revised several others that were started before our association with PKAL. These initiatives are beginning to pay off in a learning environment in which research, inquiry-based learning, and practical applications are integrated into all levels of the curriculum of several programs. We are enjoying much success but have also dealt with and continue to face various challenges. A major goal is to ensure that currently successful activities become tightly woven into the fabric of the College, so that they are second nature to all constituents of the campus community. More specifically, our additional goals include:

- Continue curricular reforms in chemistry and mathematics.
- Revise core curriculum mathematics requirement and incorporate a quantitative literacy requirement into all programs.
- Establish the policies and procedures for the Office of Research Development and publicize its services and opportunities campus-wide.
- Encourage widespread participation in the seed grant program through the NIH NICHD EARDA grant.
- Create additional experiential learning opportunities within the Science and Mathematics Division, including an honors mathematics senior research capstone and multiple service learning opportunities. Build additional types of opportunities into the existing research capstone experiences in biology and chemistry, such as industrial and clinical internships.
- Work with the Education Division to investigate the feasibility of a secondary and/or middle school degree program in mathematics and science education.
- Work with the Nursing Division to revise and strengthen the science and mathematics preparation of nursing majors.
- Modify the College's core curriculum to ensure all students attain objectives, such as critical-thinking and problem-solving skills, instead of simply meeting distribution requirements with no common skill sets.
- Continue to add full-time faculty lines in the Division that will support and extend our vision.

### SECTION 3. WHO IS INVOLVED?

(a) What are the roles of the different members of the PKAL leadership team? Please include specific names, titles and roles. Please describe changes on the leadership team and their effects.

The PKAL Leadership Team at Villa Julie College consists of the following people:

Paul D. Lack, Ph.D.  
Executive Vice President for Academic Affairs and Dean of the College  
Professor of History  
(original team member)

Susan T. Gorman, Ph.D.  
Division Director, Science and Mathematics Division  
Professor of Biology  
Chair of the PKAL Leadership Team  
(original team member)

Meredith C. Durmowicz, Ph.D.  
Chair, Department of Biological Sciences  
Assistant Professor of Biology  
(original team member)

Ellen M. Roskes, Ph.D.  
Chair, Department of Chemistry and Physical Sciences  
Professor of Chemistry  
(original team member)

Carol A. Schmidhauser, M.S.  
Instructor, Department of Biological Sciences  
Chair, Science and Mathematics Division Assessment Committee  
(original team member)

Susan P. Slattery, Ph.D.  
Chair, Department of Mathematics  
Professor of Mathematics  
(joined team in 2005)

All but one of the PKAL Leadership Team members serve the College in an administrative capacity, and the remaining member serves in prominent positions on both Division and College committees. These positions give the PKAL Leadership Team a vantage point from which to disseminate PKAL ideals throughout the campus, the authority to foster change, and the resources to encourage faculty- and student-led initiatives.

In many ways, the addition of a new team member, Susan Slattery, the Chair of the Department of Mathematics, has brought new dimensions to our vision and goals. Susan and her Department have reached out to the rest of the campus and proposed new quantitative literacy standards that will improve the math skills of all students. In addition, she has extensive experience in outreach activities targeting local area school children, and this fall we have become involved in a community-based robotics competition. Most recently, Susan has agreed to provide the oversight and direction for our Summer Science Camp program, whose founding leader left Villa Julie College in August 2006 to pursue a Ph.D. degree in toxicology.

**(b) What is the role of the PKAL leadership team on your campus?**

The PKAL Leadership Team has intentionally directed its efforts toward initiating transformational change in the Science and Mathematics Division, so as to serve as an inspiration for change throughout the rest of the institution. Believing that success begets success, our strategy has been to lead by example. We have made extensive changes in the Division relating specifically to our vision of a research-rich learning environment, and we are beginning to see these or similar changes taking hold in many other areas of campus.

Carol Schmidhauser (PKAL Leadership Team member) and another science faculty member have been very involved in defining and assessing the College's General Education program ("core"). They are also involved as members of the Academic Affairs Committee of the Faculty Council, a group charged with oversight of the entire curriculum. Their collective leadership in academic affairs has helped to shape the College's curriculum and its assessment.

As the chief academic officer, Paul Lack (PKAL Leadership Team member) has enriched and challenged the College by serving as a change agent who is blazing the trail toward lofty new heights. His accomplishments to date include establishing an Honors Program, defining a Study Abroad program, facilitating a transformation of the library, and infusing Learning Beyond into the College's curriculum.

**(c) Who are the people and groups, beyond the leadership team, that are advancing change on your campus? Please think as broadly as possible to include faculty members, students, staff, senior administrators, admissions, student affairs, senior faculty members ... How did involvement of these people and groups change over time? What roles do these groups or individuals play?**

In addition to the PKAL Leadership Team, other people and offices on campus are working to advance change and to support the College's vision, which identifies VJC as having ". . . a college curriculum with a strong tradition of liberal arts, science, and advanced technology." Included below are people and offices whose activities have had a significant impact in the academic, extracurricular and administrative functions of the College. The year in parentheses indicates the inception of the activity/program.

## **ACADEMIC FUNCTIONS:**

### **Career Architecture (2001)**

Kevin Manning, College President

Ellen Yerman, Executive Director, Career HQ

In 2001, the Science and Mathematics Division piloted *Career Architecture<sup>SM</sup>* in its Freshman Seminar classes. *Career Architecture<sup>SM</sup>* is a process of self-exploration designed to help students plan their career paths beyond graduation and even beyond their first job. Activities are designed to assist students with self-discovery, career development, career exploration and career preparation.

Dr. Kevin J. Manning won *The Daily Record 2003 Innovator of the Year Award* for his *Career Architecture<sup>SM</sup>* initiative. Part of the published write-up is included here to illustrate the campus climate established by the College's president.

*"The Daily Record's Innovator of the Year awards program honors people with imagination, vision and the ability to see a real need and fill it. Innovators have the courage to make change and the stamina to await the results."*

The Science and Mathematics Division played a pivotal role in establishing *Career Architecture<sup>SM</sup>* at Villa Julie College. In addition to piloting the initiative, the Division was involved in writing the proposal to seek financial support from the Verizon Foundation, which was subsequently awarded. The Division continues to support *Career Architecture<sup>SM</sup>* and, in fact, *Career Architecture<sup>SM</sup>* is such an integral part of our programs now that it is almost taken for granted.

*Career Architecture<sup>SM</sup>* has taken root across the campus and is a large part of what defines our institution. The College's vision is to become a national leader in career education, and in April 2006 Villa Julie hosted its first annual National Career Conference. Representatives from the Science and Mathematics Division were proud to participate in this conference and had the opportunity to share what worked for us with a national audience.

### **College Honors Program (2004)**

Ora Freedman, Program Coordinator (Fall 2006) and Professor of Economics

Meredith Durmowicz (PKAL Leadership Team member) served as Chair of the Honors Subcommittee of the Academic Affairs Committee while a full-time faculty member. She very ably led and fostered the creation of an Honors Program at the College, which is now in its third year.

The College offers students membership in the College Honors Program based on academic achievement. One requirement of the program is that students take a series of interdisciplinary courses. Members of the Science and Mathematics Division have paired with faculty in other disciplines to offer courses, such as:

- “The Burden of Disease” – Biology and History Faculty
- “The Many Faces of Genius” – Mathematics and History Faculty
- “Art Meets Physics” – Physics and Art Faculty
- “Puzzles and Paradoxes” – Physics and Philosophy Faculty

Such courses increase the visibility of the Division’s faculty and show a commitment to enlightening students as to the ways in which the sciences pervade everyday life.

As of this date, science majors comprise 22% of the Honors Program.

### **Development of New Majors**

The Science and Mathematics Division developed new Bachelor’s degree programs in Biotechnology (1999), Applied Mathematics (2002) and Medical Technology (2005), and a new Master’s degree program in Forensic Science (2005). These new degree programs were proposed in response to an increase in the demand for graduates in these fields and have attracted increased interest in the Division from prospective students and the wider community.

### **Development of New Research Courses in Biology and Chemistry (2004)**

Students in the sophomore or junior year perform laboratory research under the guidance of a faculty mentor and present their work to the campus community at the Division’s semi-annual poster session. These courses allow students to experience the research laboratory early in their college careers and enable the student to gain a deeper awareness of career interests and expectations.

## **Learning Beyond (2006)**

Marilyn Julius, Chair of Ad Hoc Committee and Associate Professor of English

A campus-wide “Learning Beyond” initiative conceived by Paul Lack (PKAL Leadership Team member) is being implemented to foster additional out-of-classroom learning experiences for the students. Learning Beyond activities can take place on- or off-campus. (See Section 2c.)

Historically, students in the Science and Mathematics Division have participated in Learning Beyond activities through off-campus placements in internships and senior capstone experiences. Students in the Division present the results of their experiences to the campus community at the Division’s semi-annual poster session.

## **Library**

Maureen Beck, M.L.S., M.A.S., Director of Library Services

The Library collections in the sciences have been strengthened greatly over the past few years with the acquisition of full text digital resources in the sciences. In 2000, library staff relied upon print indexes for access to current scientific literature, and used traditional inter-library loan to fill article requests. Faculty also encouraged students to use local library collections for their research. One early cost-effective solution was to allocate a modest sum for commercial document delivery, and a system was created whereby science majors could order 3 documents free of charge. The library paid an average of \$20 per article, with items arriving within 2-3 days, much faster than inter-library loan. While this represented an improvement, as additional science faculty were hired, many of whom came from environments with better library collections, pressure to obtain full text science digital resources increased.

In 2003, the library subscribed to a couple of modestly priced biology databases. A year later, it initiated subscriptions to the more comprehensive full text Elsevier chemistry collection. Increased demand for resources to support original student laboratory research working with faculty also led to a shared subscription to SciFinder Scholar (i.e. Chemical Abstracts, the primary research tool for research in chemistry). The American Chemical Society online journals, and another Elsevier full text subscription have been acquired in the past two years. Many of these resources can be used by students from their home computers. A popular program known as the Journal Linker finds full text in our 40-plus subscription databases.

An analysis of the overall library electronic subscriptions revealed that we have gained access to more than 16,000 titles spread across all disciplines! In the sciences, our current subscription to ScienceDirect College Edition includes full text access to almost 2000 scholarly and peer-review journals in chemistry, biology, health and life sciences, social sciences, and physical sciences. With the backfile of 5 years, this represents thousands upon thousands of articles. Any VJC user can set up an alert system by

topic, journal, citation or even search query to notify him or her when a new and relevant article is published. ScienceDirect usage statistics show how valuable this resource is to our students and faculty.

Another transformational event occurred in the summer of 2005, when the Library joined a consortium, affording Villa Julie students access to all five college level collections. Materials are delivered to the campuses, in many cases, within 24 hours of request. All but one of the partner institutions in the consortium offer a program in chemistry and mathematics, and all offer a Biology degree program. The advantages for students and faculty are obvious: the libraries are able to cooperate in acquiring materials, and to expedite delivery among campuses, with benefit to all.

Also notable is Villa Julie Library's information literacy program, which teaches students in the sciences to identify, locate, and use high quality information resources. Science students now are introduced to the Library in Freshman Seminar. Their information literacy skills, as defined by the Association of College and Research Libraries Guidelines for Information Literacy, develop through a mixture of formal course-integrated instruction and point-of-need interactions with librarians and faculty.

### **Self-Study, Middle State Association (MSA) Commission on Higher Education (CHE) (2006-2008)**

Paul Lack, Ph.D., Co-Chair, Executive Vice President for Academic Affairs and Dean  
Jim Salvucci, Ph.D., Co-Chair, Assistant Professor of English Language and Literature

Many of the faculty and academic administrators in the Division are involved in preparing for the MSA accreditation visit scheduled for the spring of 2008. Nine Working Groups (WG) were established in 2006 and two faculty from the Department of Biological Sciences are co-chairing WG 9, which is responsible for assessing the College's General Education program (MSA Standard 13). Science and mathematics faculty and academic administrators serve on seven of the nine working groups.

Each Working Group brings faculty from all disciplines together, which, in turn, fosters discussion of what is presently occurring at the College and how it is being accomplished. These conversations help to inform and expand pedagogical ideas and concepts amongst the faculty as a whole.

Other benefits to faculty that derive from serving on a Working Group include heightened awareness of the challenges faced by students and other departments on campus. This awareness, in turn, fosters creativity in seeking new alternatives to address these challenges.

### **Study Abroad (2004) and the Coastal Studies Semester (2005)**

Barbara Vlasisavljevic, Program Coordinator and Professor of Accounting

Students in the sciences were among the first at the College to venture abroad as part of their education. Susan Gorman (PKAL Leadership Team member) established an opportunity through the School for Field Studies (Boston University) and two students spent the summer in Kenya, Africa in 2000 at the Center for Wildlife Management Studies. In 2002, three students went to Australia to the Center for Rainforest Studies. More recently, Meredith Durmowicz (PKAL Leadership Team member) arranged for Villa Julie College students to be eligible for the Coastal Studies Semester offered by Hood College. This Coastal Studies Semester provides an opportunity for students to travel along the Atlantic Coast of the United States while engaging in studies related to marine science and policy.

Through the recently established Study Abroad Office directed by Barbara Vlasisavljevic, students have an opportunity to participate in curricular programs in a variety of countries. Science and Mathematics students have recently studied in Costa Rica and Spain through the Council on International Educational Exchange (CIEE) program, and in New Zealand through Arcadia University.

### **Supplemental Instruction (2002)**

Christine Flax, Director of the Academic Link and Assistant Professor of English

Division Supplemental Instruction (SI) Coordinators:

Joan Beemer (2003-2005), Assistant Professor of Mathematics

Diane Payne (2005-2006), Instructor of Chemistry

Susan Slattery (2006 to present), PKAL Leadership Team member; Professor and Chair, Department of Mathematics

The Department of Biological Sciences piloted the Supplemental Instruction program in a single section of a freshman General Biology course in Fall 2002. This program has grown to encompass multiple sections of courses in Biology, Chemistry, Mathematics and Physics in the Division, as well as Accounting and Psychology courses. Classes with a high "D/F/W" rate are targeted for inclusion in the program.

VJC hosted a three-day Supplemental Instruction Regional Training Workshop from March 30 – April 1, 2005. Eighteen participants (9 from out-of-state) learned how to create an action plan or enhance an existing SI program. All participants received a certificate from the University of Missouri, Kansas City, for completing the training requirements.

## **EXTRACURRICULAR FUNCTIONS**

### **Advisory Boards**

At Villa Julie College, Advisory Boards are an extremely valuable resource at all levels of operation. The Science and Mathematics Division was created in 2001 as part of the new President's reorganization strategy. The department structure was defined in 2002, creating the Department of Biological Sciences, the Department of Chemistry and Physical Sciences, and the Department of Mathematics.

The Division established an Advisory Board that met annually from 2002-2005. Made up of individuals representing both industry and academia, the Board contributed many insights and practical suggestions for program development and enrichment. Our new master's degree program in forensic science is an example of an idea that germinated in the context of our Advisory Board.

As the Division and the Departments have grown, the Division's Advisory Board recommended that we move to establish a separate Board for each Department and to disband the Division's Advisory Board. To this end, the Department Chairs have sought out prominent members of the community and invited them onto their boards. The Advisory Boards for all three Departments have each met once and the outcome was very positive in all cases. The smaller, more focused Board meetings allow the Departments to pursue more directly matters related to their own growth and development. Furthermore, the size and scope of these Boards now permit all faculty to be invited to meetings and to hear directly from the people representing industry, employers and academia.

### **Club Med (1995-2006)**

Susan Gorman (Faculty Moderator, 1995-2005)

Meredith Durmowicz (Faculty Moderator, 2005-2006)

The purpose of this club was to provide students who were interested in pursuing careers in the health professions with educational, social, service, and leadership opportunities. Club Med sponsored annual events including a fall trip to an amusement park (Six Flags or Hershey Park), a holiday service project (Board of Child Care) and a health fair (Health Quest). The club also maintained a library of material pertaining to the variety of programs and opportunities available in health-related fields. All interested students were welcomed and encouraged to join.

### **Kappa Mu Epsilon Mathematics Honor Society (2005)**

Christopher Barat, Faculty Mentor and Associate Professor of Mathematics

The VJC chapter of this national honor society is open to any student on campus who meets the nomination criteria. The chapter membership currently includes students who are majoring in Applied Mathematics, Biology, Biotechnology and Chemistry.

The chapter holds an annual initiation ceremony, and is planning to sponsor a number of academic and social events throughout the year.

### **Office of Research Development (2006)**

Diane Payne, Director and Instructor of Chemistry

In September 2006, the College received a grant from the National Institutes of Health (NIH, NICHD, EARDA; #1 G11 HD051258-01) to establish an Office of Research Development (ORD) on the campus. In the second through fifth years of this five-year award, a portion of the grant funds are available to be used as seed grants to encourage faculty from any discipline to engage in research projects that relate to the health initiatives of the NIH. Research proposals may be interdisciplinary in nature.

Meredith Durmowicz, Susan Gorman, Paul Lack and Ellen Roskes (all PKAL Leadership Team members) were involved in writing and submitting the grant.

### **Robotics Competition (2006)**

Susan Slattery, PKAL Leadership Team member; Professor and Chair, Department of Mathematics

During the Fall 2006 semester, the Science and Mathematics Division will host a middle school robotics competition for an after-school program serving inner-city Baltimore youth. Faculty will serve as competition judges and will create a STEM-related activity for the participants. Participants will receive information about majoring in science and mathematics and will have an opportunity to tour the science facilities. Susan Slattery (PKAL Leadership Team member) is serving as the campus coordinator for this event.

### **Society for Science and Math (2006)**

Karen Hatwell, Faculty Moderator and Assistant Professor of Chemistry

Students in the sciences formed a student organization, Club Med, in 1995 (see above). As the Science and Mathematics Division grew, its students began seeking opportunities to self-identify with peers in their majors. They sought out the opportunity to redefine the Division's student organization in order to make it more appealing to students in all majors rather than restricting membership to those with an interest in the health professions. Through a series of discussions, the students decided to form a single organization, rather than creating individual clubs for each major. They named their group The Society of Science and Math and believe that having a single club will encourage interdisciplinary contact among the students through an array of educational and social activities. So far in their inaugural semester, Fall 2006, they have launched a logo contest, are hosting a Chemistry Magic Show, in celebration of National Chemistry Week, and will sponsor a trip to Hershey Park.

### **Summer Science Camp (2000)**

Jody Johnson (2000-2006), Science Laboratory Safety Manager and Instructor of Chemistry

Susan Slattery (2006), PKAL Leadership Team member; Professor and Chair, Department of Mathematics

The Science and Mathematics Division holds an annual summer science camp for area youth aged 8-12 years. This week-long camp exposes the participants to a variety of science disciplines, and has included activities related to zoology, physics, astronomy, chemistry, botany, and forensic science.

### **Summer Science Scholars Research Project (S<sup>3</sup>RP; 2004)**

The S<sup>3</sup>RP is designed to provide select VJC science majors with an experiential learning opportunity that will give them a competitive advantage in their pursuit of employment, graduate or professional school. S<sup>3</sup>RP students work full-time for 10 weeks during the summer in one of our campus research laboratories under the guidance of a faculty mentor. They experience life as a research scientist, and discover how to celebrate their successes in the laboratory and how to learn from their failures – skills that will translate well into any facet of life. This program provides an exceptional opportunity for promising students to combine all four elements of *Career Architecture*<sup>SM</sup> in a single capstone-like experience. Outcomes related to Self-Discovery, Career Development Foundations, Career Exploration and Career Preparation are the fringe benefits for the students selected for this program.

Two students from the Department of Biological Sciences and two students from the Department of Chemistry and Physical Sciences are selected for the S<sup>3</sup>RP opportunity each summer. One faculty member from each department is selected to serve as the research mentor for each pair of students.

Meredith Durmowicz, Susan Gorman, Paul Lack and Ellen Roskes (all PKAL team members) were involved in establishing and funding this new program.

### **ADMINISTRATIVE FUNCTIONS**

#### **Faculty Development Research Grants Program (2003)**

Full-time faculty are eligible for grants to support research, including research related to teaching. Grants may be used to fund collaborative research projects that integrate learning between disciplines. Several Science and Mathematics Division faculty members have received grants through this program, which was conceived and implemented by Paul Lack (PKAL Leadership Team member).

#### **Office of Institutional Research and Assessment (2005)**

Jo-Ellen Asbury, Ph.D., Assistant Vice President for Academic Affairs

Dr. Asbury oversees the program review and assessment processes and supervises the associate dean who gathers the enrollment data need to facilitate these program reviews from institutional frozen files. The Office of Institutional Research and Assessment also administers funding for faculty to travel to conferences and other professional development activities. Faculty participation has been good, as evidenced by the fact that last year the need exceeded the budget allocation.

(d) Do you have senior administrative support? If so, how has it been demonstrated, e.g. attendance at PKAL and related workshops and events?

The initial suggestion to become involved in PKAL was made by Paul D. Lack, Ph.D., Executive Vice President for Academic Affairs and Dean of the College, who continues to serve on the PKAL Leadership Team. His role as the senior academic officer of the college has facilitated the activities of the PKAL Leadership Team and provides continuing senior administrative support for the ideals of PKAL on campus. Dr. Lack has attended two PKAL workshops with the team: Hope College (April 2005) and UMBC (October 2005).

Villa Julie College's President, Dr. Kevin J. Manning, made the initial contact to set in motion the proposal process that ultimately yielded an award to the College from the National Institutes of Health (NICHD EARDA Grant #1 G11 HD051258-01).

Dr. Manning also devoted his semi-annual President's Advisory Council (PAC) meeting to STEM related issues. A Villa Julie College Case Study entitled *STEM Education in an Era of Globalization* was circulated to all PAC members and was discussed at a meeting held in late October 2006.

(e) Since members of the PKAL Inquiry Task Force are coming to campus, who do you recommend that we talk to during the visit?

For more information about advancing change on the campus, the PKAL Leadership Team recommends that the PKAL Inquiry Task Force speak to the following people during its visit:

- Kevin J. Manning, Ph.D., President
- President's Cabinet (President, Dean, Admissions, Marketing, CFO)
- Paul D. Lack, Ph.D., Executive Vice President for Academic Affairs and Dean
- Dean's Cabinet (Assessment, Library, Student Support, Registrar, Educational Technology)
- PKAL Leadership Team
- Division Directors
- Jo-Ellen Asbury, Ph.D., Assistant Vice President for Academic Affairs
- Barbara Vlasisavljevic, J.D., Professor of Accounting, Study Abroad Coordinator
- Ora Freedman, Ph.D., Professor of Economics, Honors Program Director
- Arts and Humanities Department Chairs and Faculty
- Students
- Research Faculty
- Office of Research Development

#### **SECTION 4: WHAT SUSTAINABLE AND MEANINGFUL CHANGES ARE IN PLACE?**

What sustainable, meaningful, documented changes are in place to enable your institution to realize your vision?

Since becoming involved with PKAL, much curricular change has occurred at Villa Julie College. In preparing this Case Report, it became evident that we lack some of the documentation that would support our claims of meaningful change. It may be possible to reconstruct some of the data, especially for the Science and Mathematics Division, though to do so will require a significant amount of time. For example, we would like to have the data to analyze patterns over time of:

- Research activity
- Student presentations
- Professional development
- Faculty productivity in scholarship

In terms of indirect evidence, we can point to the results of the NSSE survey and assert that enhanced student engagement is a leading indicator of a transformation in learning.

(a) What are the documented changes in curriculum requirements?

Please note that the documented changes are organized by department.

**Biology and Biotechnology:**

As result of the program review completed in 2003-2004, the biology and biotechnology curricula were both completely redesigned. In addition to changes to required courses, both curricula now incorporate a significant amount of inquiry-based learning at all levels of the curriculum. In both programs, the required introductory biology sequence was expanded to three semesters in place of the traditional two semester sequence and a 200-level molecular biology techniques course was added as a requirement for all majors. All four of these courses incorporate varying combinations of directed laboratory activities and team-based independent projects that enable students to learn basic lab skills and techniques, as well as develop skills in hypothesis creation, experimental design, data collection and analysis and teamwork. Students also gain experience in keeping a laboratory notebook, reading and writing scientific articles and orally presenting their work.

In response to suggestions from industry representatives, the biotechnology curriculum was further redesigned to more accurately reflect the interdisciplinary nature of the field. Students are now required to take Instrumental Analysis and Analytical Chemistry in addition to the four semester general and organic chemistry sequence. Students may now choose to fill their electives with biology or chemistry courses, which allows more flexibility in tailoring a program of study to students' specific future goals. In addition, a required Biotechnology Senior Seminar is being developed that will integrate the science with the business concepts. Students will take this course concurrently with their capstone internship in the spring semester of their last year of study.

## **Chemistry:**

The Chemistry Department is in the process of completing a program review and anticipates changes to its curriculum as a result of this extensive report on its progress. Changes are being planned that will reflect the new American Chemical Society guidelines for accreditation, increased lab hours for certain courses, more project-based learning, and the incorporation of more literature and molecular modeling into all levels of the curriculum.

In the last two years, courses in the department have been modified to better improve student learning:

- The General Chemistry course has added computers equipped with data collection software to each lab work station. This allows students to collect data with Vernier probes (including pH, conductivity, pressure and temperature) and to process the data immediately on the computer. This has enabled students to perform a wider variety of experiments using fewer chemicals. Additionally, the data is collected in a shorter period of time and graphical representations are delivered in real time to allow students to follow the progress of the experiment.
- The Department has partnered with local universities and community colleges to change the General Chemistry lab into a more research-oriented course. A grant will be resubmitted this academic year that will allow General Chemistry students in this consortium to work together to study the concepts of General Chemistry in the context of real problems facing the Chesapeake Bay.
- Analytical Chemistry has been made much more rigorous, focusing on the incorporation of more statistical analysis and the writing of extensive lab reports.
- Instrumental Analysis and Physical Chemistry, both upper level courses, now have project-based laboratory components.
- Two new undergraduate research courses were added to the curriculum (Chem 265 and 365). Both allow for students to receive credit for performing research with faculty members. One of these courses (Chem 365) has run consistently every semester for the last two years allowing three chemistry majors to perform research with a faculty member every semester.
- An internship program was implemented this year for interested students. The Department has partnered with several local chemical companies who are eager to provide internship positions for our students. This program will be further developed over the next year.

### **Mathematics:**

Prior to its program review in the 2005-2006 academic year, the Department of Mathematics had created or modified several courses for both the Applied Mathematics degree program and other programs on campus to include inquiry-, project-, or research-based learning. These courses included a statistics course for Business and Psychology majors that was modified (2004) to include a computer-based laboratory component, a statistics course for the Biology and Chemistry majors (2005) that includes science-based applications, a special topics course in applied mathematics for Applied Mathematics majors (2005), and a senior capstone research course for the new Applied Mathematic major (2002). A mathematical modeling course is offered by the Department, but predates the involvement in PKAL. With the exception of the senior capstone course, these courses are open to any student who meets the prerequisite requirements regardless of major.

Upon completion of its program review, the Mathematics Department began the process of modifying its existing courses and creating new courses to improve its offerings. A major goal of the 2006-07 academic year is the revision of the core-level mathematics courses to better address the need for quantitative literacy for all students. The Mathematics Department is proposing to create one algebraically-based course and one statistically-based course to satisfy the needs of the non-science majors in the College whose programs only require a single college-level mathematics course. These courses must prepare the students to use the mathematical and/or statistical concepts in their chosen degree programs and careers. For this reason, the courses will emphasize applications which, although at an introductory level, will incorporate inquiry- and project-based learning activities.

The Department of Mathematics has established an advisory board to assist it with the curricular changes indicated through the program review process. The board has representation from Ph.D. granting institutions, K-12 mathematics education, industry, and government. The board will advise the Department on proposed topics for courses, internships, and off-campus sites for senior research projects. The first meeting of the Mathematics Advisory Board was held in October 2006.

(b) What are documented changes in requirements for inquiry-based and project-based research experiences?

**Biology and Biotechnology:**

Several of the courses in the new biology and biotechnology curricula incorporate significant inquiry-based or project-based work in a formal manner. Each of the courses in the new three-semester introductory biology sequence incorporates at least one extended (4-6 week) independent project during which students work in teams of four to choose a question or problem of interest, create a hypothesis, design and carry out experiments to test the hypothesis and analyze and present their data. The three courses build on each other, starting with smaller scale projects in the first semester and expanding to semester-long projects in the third semester.

In addition to the introductory course sequence, two molecular biology techniques courses have been redesigned or created to include independent student research. Our 200-level techniques course incorporates directed laboratory exercises to teach the basic techniques with a semester-long project that every student group in the class conducts. Students are given the initial research problem, and each team is responsible for planning and carrying out their own approach to the problem using the techniques they are learning. In the 300-level techniques course, each student team chooses their own project from a list of research problems related to academic and industry settings. The teams then spend the semester planning and carrying out their approach to the investigation, mainly using techniques that are familiar to them. The instructor acts as a mentor, and is available to demonstrate any techniques that are new to the students. Throughout both of these courses, the students are asked to present their work in various oral and written formats.

Biology and Biotechnology students also have the opportunity to conduct research with a faculty member for academic credit through two research courses, one each at the 200- and 300-levels. Both of these courses enable students to get into an academic research laboratory setting and work with a faculty member on an ongoing project, as early as the second semester of the freshman year. These courses lead very nicely to and are excellent preparation for the research and internship capstone experiences, which have been a requirement in the Biology and Biotechnology programs for some time.

**Chemistry:**

Over the last two years, several courses in the Department have incorporated inquiry-based and project-based research experiences into their curriculum. Three of the upper level courses, Instrumental Analysis and Physical Chemistry I and II, are now project based courses. Students perform multi-week laboratories on instructor-selected projects or ones of their own choosing.

Chemistry students have the opportunity to conduct research with a faculty member for academic credit during both semesters of the academic year and in the summer. Students are mentored by faculty members with ongoing research projects. Students can do this for one semester or for multiple semesters. When we started this course two years ago, we had only one faculty member mentoring students. The course is now being supported by three chemistry faculty members. Students have found this course excellent preparation for their senior capstone research experience.

**Mathematics:**

Every student majoring in Applied Mathematics is required to complete a senior research project. The Mathematics Department currently offers MATH 450: Senior Project. In keeping with the recommendations from its program review, the Mathematics Department is creating a second option, MATH 460H: Honors Senior Project, for implementation in the 2007-08 academic year. The new course will allow for a more intensive research experience for qualified students.

(c) What are the number of faculty members offering learning experiences that incorporate inquiry, projects and research?

### **Biology and Biotechnology:**

Due to the revisions to the Biology and Biotechnology curricula, most of our faculty are now regularly incorporating inquiry-based learning into their teaching. All full-time faculty members (six total) and six of the nineteen adjunct faculty members have been involved in planning and/or teaching at least one of the introductory and molecular biology techniques courses over the last two years. These faculty also teach other courses, and have worked to incorporate more of these types of activities into those courses, as a result of the success they are seeing at the introductory level. In addition, several other adjunct faculty members use single assignments or activities in their courses that incorporate research-like or inquiry activities. Some examples include bioinformatics projects in microbiology, immunology and an upper level bioinformatics course, an unknown project in microbiology and product portfolios in lab safety and lab management courses.

### **Chemistry**

Most of the upper level courses in the Department have project-based learning experiences. About half of our faculty incorporate such learning experiences into their courses.

We are participating in a grant submission that will allow us to partner with local institutions and will allow for project-based learning in our General Chemistry curriculum. Based on our program review, we are planning a training of our faculty to follow the Project Oriented Guided Inquiry Learning model recommended by our Keck-PKAL consultancy. This will allow for more project-based learning spread to all of our courses.

### **Mathematics:**

The Mathematics Department consists of five full-time faculty members and eight adjunct faculty members, all of whom have incorporated project-based learning experiences into some of their courses. Due to the applied nature of its degree program, the Department's 200, 300, and 400-level courses all include suitable activities, but some of the core-level courses are noticeably lacking such valuable learning experiences. The deficiencies in the core-level courses were identified during the program review and the Department has begun the process of proposing more suitable course content for these courses.

### **Beyond the Science and Mathematics Division:**

Paul Lack (PKAL Leadership Team member) has worked to establish a Learning Beyond requirement for every student at Villa Julie College. In 2004, the first service learning courses were introduced to the college in philosophy and history. This prompted a proposal to allow all courses to add a service learning component for 1 credit. This proposal was approved in September 2006 by the Academic Affairs Committee of the Faculty Council. This proposal is part of a campus wide initiative to provide all students with experiential learning experiences.

Also in 2006, an ad hoc group of faculty and administrators was assembled and tasked with generating ways to extend and enhance experiential learning opportunities for students. Under the general mantra of "Learning Beyond" the classroom, this group focuses on all forms of experiential learning – research, internships, practicums, clinicals, service learning, and cultural engagements. The approach is to integrate such experiences so fully into the curriculum that every student will benefit. At this date, most programs have complied with this vision to provide some sort of experiential learning opportunity for their majors.

#### **(d) Are there documented changes in assessing student learning?**

There have been many changes in the area of assessment in recent years. At the institutional level, the Office of Institutional Research and Assessment (OIRA) was created in 2005 with the hiring of an assessment specialist and an institutional research specialist. These two administrators have created/refined the institutional assessment plan, required course objectives on all syllabi and administered new surveys measuring student engagement and abilities (NSSE and CIRP). They are making plans to expand the assessment of students by other means (e.g. the MAPP test produced by ETS) and to improve the departmental assessment plans. The OIRA is currently in the process of revising the goals and objectives for the College's general education program and designing a plan for assessing that program.

At the level of the Science and Mathematics Division, in 2001 an assessment committee was established and chaired by Carol Schmidhauser, at that time an adjunct faculty member, and who still is a champion of assessment. In these early days of assessment, a great deal of time and energy were spent in learning how to articulate an assessment plan and define measurable objectives. In 2002, a resource booklet for faculty in the Division was compiled by the Division Director to assist in the development of assessment plans. This booklet outlined a timetable for proceeding, provided examples and models to follow, and shared assessment resources intended to inform the process. As the Division was organized into three Departments later in 2002, the need for three separate assessment plans quickly became evident and was then the next focus of activity. During these years, assessment activities were primarily led by Carol Schmidhauser and the academic administrators in the Division. Faculty input was sought and included, but there was not an overall sense of enthusiasm for these activities.

Participation in the PKAL workshop at RPI in November 2004 inspired a new approach to building a culture of assessment at Villa Julie College. Meredith Durmowicz prepared a strategic budget initiative later that November, which requested funding in the next fiscal year for a year-long professional development opportunity in assessment.

The first comprehensive Science and Mathematics Division assessment report was prepared for the 2004-2005 academic year, and distributed in Fall 2005. The report, and the process leading up to the report, contributed substantively to the Division's assessment efforts. The report was, in effect, the first tangible fruit of our assessment labors to be harvested and provided an opportunity for faculty to see the benefits of the practice. (The complete 2004-2005 assessment report will be made available to the PKAL Site Visit team.)

In 2005-2006, the Department of Biological Sciences sponsored an assessment consultant through a funded strategic budget initiative. Dr. Katherine Alvestad delivered two full-day workshops, provided materials for eight separate faculty-directed assessment workshops, and completed a detailed review of the department's assessment plan.

At a January 2006 Division meeting, the faculty requested ownership of the assessment process for the Division. A new Division Assessment Committee (DAC) was created, membership established, and goals/responsibilities outlined. Carol Schmidhauser, PKAL Leadership Team member, chairs the DAC. The DAC members are faculty representing each major, program, or area of emphasis in the Division (applied mathematics, biology/biotechnology, chemistry, forensic science, medical technology, and physics). With this new configuration, each Department Chair will write a departmental assessment report and the DAC is charged with reviewing all three departmental reports and writing a summative divisional assessment report for the year. (The complete 2005-2006 assessment report will be made available to the PKAL Site Visit team.)

#### [\(e\) Are there documented changes in assessing capabilities of graduates?](#)

There is currently no institution-wide system in place to assess the capabilities of our graduates. A number of programs administer the ETS Major Field Test (e.g. business, psychology), and there are a number of other programs whose graduates must pass a registry or licensure exam in order to be active in their profession (e.g. Medical Technology, Nursing).

A Subcommittee of the Academic Affairs Committee (AAC) was charged with developing, refining, and formalizing the assessment of the General Education core program. The Subcommittee worked over the summer of 2006 to create an educational philosophy and objectives, which were approved by the AAC and Faculty Council in September 2006. The philosophy and objectives will provide a solid framework for

assessing the capabilities of our graduates and the effectiveness of our core requirements.

The Division of Science and Mathematics established a faculty-run Division Assessment Committee (DAC) in the spring of 2006 to oversee assessment activities in each department of the division. The DAC's responsibilities include reviewing the annual departmental assessment reports, then analyzing, synthesizing and writing an annual Division assessment report, which includes recommendations for improvement.

The Department of Biological Sciences refined its assessment plan to ensure that the new curriculum is more effective than the old. The Department developed a student survey to measure self-perceived skill improvement, and it is working on developing pre- and post- measures for cognitive improvement.

[\(f\) To what extent has the project made connections between the espoused vision and the contemplated sustainable and meaningful changes?](#)

The PKAL Leadership Institution Initiative has served as a catalyst for transformation at Villa Julie College. As described throughout this Case Study Report, our PKAL involvement has allowed us to hone our vision, facilitate meaningful change, and improve the quality of STEM education at the College.

[\(g\) Are there changes in approaches to faculty development?](#)

The Center for Excellence in Teaching (CET) was created in 2004 to provide support for faculty professional development, encourage effective use of technology in teaching, and provide resources for faculty on enhancing teaching effectiveness.

Some of the services available through the CET include:

- Structured programs and workshops to enhance teaching effectiveness
- Informal programs (such as teaching circles) to promote collegiality and improve interdisciplinary communication
- Funding for faculty conference attendance
- Funding for faculty research grants

Villa Julie College offers a small number of Faculty Development Research Grants each year in the amount of \$2500 each. Through a competitive application process, faculty are selected to receive financial support for their research initiatives. The terms of the grant include a scholarly presentation of the work to the campus community in the fall semester following the award year.

In September 2006 another staff position was added in the Human Resources Office to provide help with faculty development and issues related to organizational behavior.

## **SECTION 5. WHAT STRATEGIES AND ACTIONS ARE BEING EMPLOYED TO BRING ABOUT SUSTAINABLE AND MEANINGFUL CHANGES?**

(a) How did implemented strategies differ from the proposed strategies? Why?

In our PKAL-LI application, we listed nine elements to describe what our vision of success would look like. These elements are reproduced below for clarity.

- An established culture of assessment wherein the cycle of seeking, implementing and refining best-practices in teaching and learning becomes second nature.
- A STEM curriculum that provides hands-on, discovery-based experiential learning opportunities for all students regardless of major.
- Refining our applied career-based programs in keeping with the college's vision and mission, and reflecting our distinctive niche vis-à-vis *Career Architecture<sup>SM</sup>*.
- Building our math department and applied mathematics major as we have for the science departments.
- Academic programs where critical-thinking and problem-solving are the rule, rather than the exception.
- Balancing the need to improve retention of STEM majors with that of establishing reasonable standards for graduation in the STEM disciplines.
- An increasing number of majors in the sciences and applied mathematics.
- Building a truly interdisciplinary approach to science and mathematics education that draws upon and maximizes the considerable strengths of our faculty.
- A college community that embraces and values the STEM disciplines.

Then, shortly after the College was selected as an LI institution, three members of the PKAL team attended the conference at Rensselaer Polytechnic Institute (RPI). At this meeting, a take-home action plan was developed that outlined a number of steps to be taken:

- Identify team member responsible for evaluation.
- Take Meyers-Briggs assessment and discuss the results and implications.
- Revisit and prioritize our stated PKAL goals.
- Rewrite our vision statement.
- Educate other departments about the Biology Department's ongoing experiences in the curricular review/redesign process.
- Assess our assessment plan and revise it as warranted.

These six action steps, together with the nine elements of success that we outlined in our LI proposal, have served as a template for developing strategies and action plans to guide our efforts to bring about sustainable and meaningful changes at Villa Julie College. In the context of this case study, they can be considered to be our "proposed" strategies.

Our implemented strategies are consistent with our proposed strategies, and they describe what is currently in place to promote the sustainability and institutionalization of meaningful change. Each implemented strategy is listed below and then described more fully in the following sub-sections.

- Identify and articulate the main specific outcomes that are expected to derive from our involvement as a PKAL-LI institution.
- Inform, encourage and support faculty development in new pedagogical methods, including the use of case-based learning, inquiry-based learning, group learning, and redesigning laboratory activities to promote student-directed experimentation.
- Guide curricular transformations that are consistent with how people learn and that incorporate the process of scientific inquiry at all levels, so that students learn how to think.
- Expand research opportunities for students and faculty.
- Build and nourish a community of science and mathematics on campus.
- Strengthen and grow the PKAL leadership team by providing the time and resources for personal and professional development as leaders and change agents.

(b) What strategies are now in place to promote sustainability and institutionalization? What actions have been employed to support these strategies?

**Strategy: Identify and articulate the main specific outcomes that are expected to derive from our involvement as a PKAL-LI institution.**

In the fall of 2004, our PKAL team engaged in brainstorming to come up with the specific outcomes that we expected to see based upon our involvement with PKAL. We identified these outcomes in the month following the conference at RPI (November 2004):

- Increased variety of pedagogical methods in science (e.g. case-based learning, group activities, increased demonstrations of the relevance of science as it relates to students' lives)
- Embracing more engaging and effective ways of teaching. Faculty will learn how to teach students how to think, rather than focusing almost exclusively on rote learning of facts – for example:
  - the implementation of more and earlier research opportunities in science education
  - within the structure of laboratory courses, student-directed laboratory experimentation
  - exercises that teach students how to apply factual knowledge to novel situations
  - examination strategies that test students' ability to manipulate factual and theoretical knowledge in different ways
- Increased enrollment and/or number of graduates
- Increased numbers of graduates going on to graduate or professional school
- Incorporation of more "hands on" labs that mimic the true research experience at all levels of the curriculum in science
- Incorporation of more "hands on" labs that mimic the true research experience for non-majors science courses
- Excitement that inspires faculty to try new things in their teaching
- Earned respect for ideas concerning assessment and curriculum change in the division and campus-wide
- Creation and delivery of science programs that are first rate and can serve as models for others
- Achieving excellence in student learning

- Attracting greater numbers of highly capable students
- Securing external funding
- Establishing a Sponsored Research Office
- Establishing a science curriculum that incorporates "the process of science" at all levels (major and non-major), so that students learn how to think and not just recite collections of scientific facts.
- Institutional recognition/understanding that the sciences are valuable because of the thought processes that are learned, rather than simply the facts of the disciplines.

By identifying outcomes, the team has been able to assess progress toward our goals. The successes are embedded in several sections of this Case Study Report.

***Strategy: Inform, encourage and support faculty development in new pedagogical methods, including the use of case-based learning, inquiry-based learning, group learning, and redesigning laboratory activities to promote student-directed experimentation.***

Our efforts to date with regard to faculty development in the Department of Biological Sciences have been mostly of the home-grown variety led by Carol Schmidhauser and Meredith Durmowicz (both PKAL Leadership Team members). Opportunities to attend related workshops and conferences are publicized, and published articles, case studies, etc. related to new pedagogies are shared with faculty Division wide. In the Department of Chemistry and Physical Sciences, faculty have attended workshops on project-based laboratory exercises and have developed ideas based on these experiences.

***Strategy: Guide curricular transformations that are consistent with how people learn and that incorporate the process of scientific inquiry at all levels, so that students learn how to think.***

The curricular transformations are described in Section Four of this Case Study Report.

***Strategy: Expand research opportunities for students and faculty.***

The expansion of research opportunities is described in Sections Two, Three and Four of this Case Study Report.

**Strategy: Build and nourish a community of science and mathematics on campus.**

The Science and Mathematics Division has attempted to carve out small spaces for community-building in the Science Center. Small tables and chairs are arranged in hallway alcoves to promote conversation, and vending machines provide refreshments.

The Division has promoted community building through student organizations since 1995 with the creation of Club Med (see Section 3c).

New in Fall 2006, the Science and Mathematics Division is sponsoring a Speakers Series. On the third Wednesday of each month, a program in the Division will host an event featuring an invited speaker and free refreshments. The first event was hosted by the Department of Chemistry and Physical Sciences and the speaker presented "The Wonders of Combustion." The Speaker Series is advertised to the campus community and all are welcome to attend. As the series evolves, we anticipate extending the invitation to neighboring institutions.

(c) What strategies are in place to identify and develop leadership within the institution? What actions have been employed to support these strategies?

**Strategy: Strengthen and grow the PKAL leadership team by providing the time and resources for personal and professional development as leaders and change agents.**

During our first year of involvement as an LI institution, our PKAL team met weekly. These meetings were used to talk, think, reflect and plan. We read and discussed articles, essays, ideas, etc., and used these discussions to inform our process of transformation.

In November 2004, all members of the PKAL team completed the Meyers-Briggs (M-B) assessment instrument. Our campus M-B expert, Ms. Lauri Weiner, then led us through a Meyers-Briggs Type Indicator Leadership Training seminar. Our newest member of the PKAL team, Dr. Susan Slattery, completed the M-B assessment shortly after joining us in fall 2005. As we reported in a reflection statement written in March 2005, our PKAL leadership team represents the academic spectrum at Villa Julie College: one faculty member, then two (now three) department chairs, one division director, and the dean. Our team also represents the behavioral spectrum as became evident through the Meyers-Briggs assessment. Our individual hallmarks are: idealism, decisiveness, dependability, commitment, and imagination. Thus each person brings to the team a unique set of skills, experiences, and personality traits such that the whole is decidedly greater than the sum of its parts.

The M-B leadership training also opened our eyes to the “silver lining” of behaviors and personality traits that we might previously have perceived in solely negative ways. It helped us to better appreciate and understand not only each other, but all those with whom we interact.

The members of the PKAL team have been well-supported in terms of their professional development as leaders and change agents. Some examples of conferences, meetings, workshops, and professional activities that team members have attended and/or been involved with since fall 2004 include:

- *STEM Education in an Era of Globalization*. Case Study for President’s Advisory Council, Villa Julie College (October 2006).
- University Systems of Maryland Articulation Committee (2006)
- *Visions for a Competitive Workforce: Connecting Business, Education and Government*; Baltimore County Executive’s Advisory Board for Education; Stevenson, Maryland (June 2006)
- *Connecting Student Learning Outcomes to Teaching, Assessment, and Curriculum*. Alverno College Assessment Workshop, Milwaukee, WI (June 2006)
- VJC National Career Conference: Integrating a Career Culture in Your Institution, Baltimore, Maryland (April 2006)
- Association of American Colleges and Universities General Education and Assessment Meeting, Phoenix, AZ (March 2006)
- Association of American Colleges and Universities Annual Meeting: Demanding Excellence – Liberal Education in an Era of Global Competition, Anti-Intellectualism, and Disinvestment; Breakfast Roundtable Presentation: *Career Architecture<sup>SM</sup>: Villa Julie College’s Example of a Promising Practice for the New Academy* (January 2006)
- GBC Breakfast – *Nano and Biotechnology: A Winning Combination, A New Growth Industry* Baltimore, Maryland (December 2005)
- MSA-CHE Assessment Conference, Baltimore, Maryland (December 2005)
- American Chemical Society, Eastern Analytical Symposium, Somerset, New Jersey (November 2005)
- Project Lead The Way – Science Curriculum Writing for Biomedical Science Project (November 2005 to present)
- PKAL LII Conference, University of Maryland Baltimore County (October 2005)
- Governor’s Workforce Investment Board, Center for Industry Initiatives – Biotechnology Steering Committee (August 2005 – present)
- The Council of Independent Colleges Workshop for Division Chairs: *Effective Personnel Practices*, Pittsburgh, Pennsylvania (June 2005) and Chicago, Illinois (July 2005)
- Greater Baltimore BioForum Day: *Working Together for Success*; Towson University, Towson, Maryland (May 2005)
- PKAL LII Conference, Hope College (April 2005)
- Maryland Department of Business and Economic Development: “Project Aardvark” Site Team Visit; Workforce Forum – PowerPoint Presentation: *The Science and Mathematics Division at Villa Julie College* (February 2005)

- MSA-CHE Assessment Conference, Philadelphia, PA (December 2004)
- American Chemical Society, Eastern Analytical Symposium, Somerset, New Jersey (November 2004)
- LXR TEST Training Workshop, Charleston, SC (October 2004)
- PKAL LII Conference, Rensselaer Polytechnic Institute (October 2004)
- CUR Proposal Writing Workshop, East Tennessee State University, Johnson City, TN (July 2004)

As should be evident from the above list, the PKAL team members are effecting change not only on the Villa Julie College campus, but in local, regional and national venues as well.

**(d) Which strategies do you think have been most effective? What evidence and reasoning support your evaluation?**

The most effective strategies have been those associated with curricular transformation and establishing a research-rich learning environment. An early PKAL assignment was to articulate the specific outcomes that we expected to derive from our involvement as a PKAL-LI institution (see Section 5b). Identifying outcomes allowed us to implement strategies to achieve them, and we have done so by taking one small step at a time.

We have also been successful in strengthening and growing the PKAL Leadership Team. Until recently, funds to support the professional activities of team members were made available as needed. In the current fiscal year, budget cutbacks will limit this type of activity, but are not expected to have long term adverse effects on the professional development of the team.

The “evidence” to support this evaluation is described in detail throughout this Case Study Report.

One thing not yet noted, however, is the recent addition of new faculty through replacement positions, which has certainly contributed to the expansion of our research program. In August 2006, two scientists joined the Division: a behavioral ecologist in the Biology Department and a biochemist in the Chemistry Department. Both of these scientists brought with them a new energy and vitality that have added immeasurably to the community, not to mention their ongoing pursuit of research interests in their disciplines. The biochemist has jumped right in to research by serving as a research mentor for a senior research student, serving as the course supervisor for the chemistry senior projects, and serving as a research mentor for one of our master’s degree students. The behavioral ecologist has directed his early efforts toward improving the ecology course, creating a proposal for service learning in ecology, and designing a research program suitable for this part of the country, having moved here from New Mexico.

It is too soon to tell whether some of our newest initiatives are successful or not. For example, the Division's Speaker Series hosted its first speaker in mid-October 2006. An expert on combustion was invited by the Department of Chemistry and Physical Sciences, and he gave a very engaging and energetic presentation on fireworks. The calendar for the academic year was set, and we have speakers lined up for November, January, February, March and April. Each session is scheduled for two hours, with the first hour reserved for informal mingling amongst the students, staff, and faculty. It is our hope that the Speaker Series will build a sense of cohesiveness and community in the Division.

(e) Were any strategies unsuccessful? If so, what, how, and why?

The year-long assessment activity facilitated by the consultant was less successful than we had hoped. While we gained some new knowledge and help with regard to some of the "how to" aspects of assessment, faculty were reluctant to devote the time necessary for the activities to be truly successful. We found ourselves acting like some of the students that we so blithely criticize for wanting to be spoon-fed information rather than actively engaging in the learning process. Different faculty were asked to lead each lunch-and-learn session, with mixed success. (The consultant's summary report will be made available to the PKAL Site Visit team.)

We have listed as successful the strengthening and growing of the PKAL Leadership team. We are also listing it here because there is a growing concern with respect to burn-out on the part of team members. New strategies must be developed to protect against burn-out while simultaneously growing the ranks of those involved in the transformative processes on campus in order to share responsibility.

We have not yet initiated on-campus faculty development opportunities in new pedagogical methods (e.g. the use of case-based learning, inquiry-based learning, group learning, and redesigning laboratory activities to promote student-directed experimentation). As part of the next budget planning process, the Division\* will submit a strategic initiative to fund a series of campus workshops by pedagogical experts that will be of general interest to the campus community, but of specific interest to those in the STEM disciplines. So, we are optimistic that the strategy will be successful once we are able to implement it.

\* Or, if appropriate, the Office of Institutional Research and Assessment will assume the responsibility for budgeting and hosting these workshops.

## **SECTION 6. WHAT STRATEGIES AND ACTIONS ARE BEING EMPLOYED FOR FACULTY AND STAFF DEVELOPMENT?**

(a) What strategies are being employed to promote faculty and staff development? What actions have been employed to support these strategies?

Villa Julie College has always encouraged faculty and staff development. Recently, the College's strategies for faculty/staff development have evolved and expanded. The College provides funds annually for faculty/staff to attend professional conferences, and faculty/staff are encouraged to both attend and present at these conferences. Faculty/Staff opting to present at conferences are granted extra funds.

Over the years, the College has also provided internal venues for faculty to present their work and to learn from each other.

Additionally, over the past several years, teaching circles have been developed. Faculty meet in small groups and share teaching approaches that they have found to be effective.

For the past three years, the College has offered a number of competitive Faculty Development Grants for research projects. Faculty must submit a brief proposal and, if selected, receive a grant of \$2500 for the year to be used in support of the research project. The terms of the grant include a scholarly presentation of the work to the campus community in the fall semester following the award year. Faculty have used this money for research in the sciences, psychology, business, education, and history.

For the past two years, the College has supported a program for faculty in the sciences to engage in research with undergraduates. (See S<sup>3</sup>RP in Section Three) Faculty in chemistry and biology apply to participate in this program, which provides summer stipends for one faculty member and two students in each department. Many of the students conducting summer research are able to present their work at local, regional and national professional meetings.

During the summer of 2006, the Office of Institutional Research and Assessment at the College conducted a survey of faculty to determine in what areas they desired faculty development opportunities. Among the areas in which faculty identified needs were

- incorporating active learning strategies,
- facilitation skills for small group teaching,
- grant writing tips, and
- working with students experiencing academic difficulties.

The Office of Institutional Research and Assessment intends to use the results of this survey to plan a series of workshops or training sessions for faculty and staff in the areas identified as most relevant to the survey responders.

Furthermore, Villa Julie College was awarded a grant from NIH to support the startup of an Office of Research Development (ORD), to begin in the current (2006-2007) academic year. The faculty member identified to lead this office attended training at NIH during the summer of 2006, and the ORD has begun operation this fall. During the Fall 2006 semester, faculty will be informed of the availability of seed money from the NIH grant. Interested faculty will submit proposals toward the end of this semester, and the grants will be awarded in the spring, for a July 1, 2007, start date. The purpose of this grant is to encourage faculty to seek other funding based on the results of their research funded with the seed money. Faculty seeking these seed funds must commit to applying for outside grant funding for further research.

**(b) Which strategies do you think have been most effective? What evidence and reasoning support your evaluation?**

All of the strategies described in Section 6a above are effective because different approaches work well with different faculty members. Because of the variability among our faculty, each strategy is important because each strategy is used by some of our faculty members. Each opportunity for development attracts self-selected faculty, but none of them is attractive to all faculty. In part, this relates to the stage of development at Villa Julie College, which until fairly recently focused much more on teaching than on scholarly research. Faculty members are aware that the culture is changing – some more than others. In general, more recently hired faculty members are much more receptive to this change than some of the older faculty members.

**(c) Are faculty members thinking and acting differently about their roles as leaders? If so, how? What events prompted these changes? What are stories of individual growth and development as leaders?**

Faculty members have shown leadership in a variety of roles and settings within the College. Many of our department chairs have been promoted from within, taking on management and leadership responsibilities as academic administrators. Other faculty members have taken on other types of leadership roles. For example, a number of faculty from all areas of the College are involved in leadership positions within Faculty Governance. Others lead cross-disciplinary programs, such as the Honors Program, Study Abroad Office, etc. One of our Science faculty members was selected to direct the Office of Research Development and received extensive training at the NIH over the summer. One of our PKAL team members has taken it upon herself to develop specialized skills in assessment and has become a consultant to faculty and staff as well as to the Office of Institutional Research.

Many of these programs are relatively new, given the many changes at the College. As these opportunities arise, faculty with leadership potential take on new roles and develop leadership capacity.

(d) Are people approaching teaching and learning differently? If so, what prompted these changes?

Faculty are approaching teaching and learning in different ways. Faculty are much more aware of different learning styles and of ways to be inclusive to ensure that they reach all students. In addition, faculty have begun to realize that active learning produces better understanding and retention of the material than a more traditional lecture.

The Office of Institutional Research and Assessment conducted a survey of faculty, as described above. Again, the results indicated that faculty were interested in obtaining skills in incorporating active learning strategies, facilitating small groups, and working with students experiencing academic difficulties. These are all signs that faculty are changing their approach to teaching.

In addition, there is a new culture of assessment at Villa Julie College. The College's approach to assessment has had a marked impact on teaching. While not all faculty have fully bought into the assessment processes, the concepts of assessment pervade all aspects of a faculty member's work. Examples include

- assessment of student learning in each course,
- assessment of academic majors and programs, and
- a system for faculty evaluation.

Because assessment is becoming such a core construct at Villa Julie College, faculty are beginning to understand that assessment is simply a part of what they must do. This assessment results in a constant feedback process that results in improvements to courses. Coupled with the opportunities both on and off campus to learn new approaches to teaching, assessment is one of the key reasons why teaching and learning are changing at Villa Julie College.

## **SECTION 7. FURTHER COMMENTS?**

None added.