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# CUR Focus

## Developing First-Year Students as Scholars

Two of the challenges of increasing undergraduates' participation in research are supporting research opportunities for students from all disciplines and involving students in research early in their college careers. Pepperdine University's Seaver College has sought ways to engage first-year students in research with the expectation of tremendous benefits for students' academic development. Three years ago when we embarked on creating and implementing what is now called the Keck Scholars Program (KSP) in honor of the W. M. Keck Foundation's support for the program, we pondered, as have others, the question: "What would happen if teachers in all disciplines allowed their students to seize the creative work right from the beginning, trusting that the important fundamentals would emerge? What would change for us, and for our students?" (Blackmer 2008, 10).

KSP introduces undergraduates to research through first-year seminar courses, which are part of the general-education curriculum. The program was built upon our belief, which the program has reaffirmed, that first-year students can make important contributions to their disciplines, even in the absence of extended exposure to discipline-specific methods. Students are not only learners; they are also developing scholars (Hodge, Pasquesi, Hirsh 2007). We seek to accelerate the shift from learner to scholar by introducing research in the first year and allowing that formative experience to shape students' undergraduate careers.

The inclusion of first-year seminars in the college curriculum aligns with best practices in higher education, including those recommended by the National Leadership Council for Liberal Education and America's Promise, sponsored by the Association of American Colleges and Universities. Among the effective educational practices cited in its 2007 report are first-year seminar courses that bring small groups of students together with faculty. First-year seminars often emphasize "critical inquiry, frequent writing, information literacy, collaborative learning, and other skills that develop students' intellectual and practical competencies," according to the National Leadership Council (2007, 53). First-year seminars at Pepperdine University meet several desired learning outcomes, two of which align closely with the outcomes of undergraduate research. In the first-year seminar, students sharpen their critical-thinking and problem-solving skills through study within a specific academic discipline, and they use written assignments and oral presentations to become more effective communicators.



*First-year students visit the Frederick R. Weisman Museum of Art at Pepperdine University during the Pop Culture exhibit for their KSP course entitled "Art and Faith in Asia," an interdisciplinary approach to key artworks, rituals, and practices associated with the religions of Asia. (Photo credit: Stephen D. Davis)*

Since the first-year seminar is the only course that is required for all first-year students and since it is offered across all disciplines, it provides the perfect platform to integrate intensive research into the general-education curriculum. Designed to connect students from all disciplines to scholarship early in their undergraduate careers, the KSP has already produced a significant change in the first-year seminar landscape. Implementing this change required careful planning and coordination among faculty, administration, and support staff.

In its second full year, academic 2012-13, Pepperdine's KSP enrolled 162 first-year students, roughly one fifth of the incoming class, in research-based courses during their first semester in college. The goal is to transform the beginning of a student's four-year college experience from a tourist's gaze (Woodiwiss 2011) to deep learning and personal scholarship (Blackmer 2008). The students in the program also realize the benefits of teamwork and collaboration (Barkley 2009) and have the opportunity to receive funding for continued research as the seminar draws to a close.

### The Keck Scholars Program Model

Six key objectives guide the vision for KSP. The program aims to:

- 1) engage students in research through first-year seminars;
- 2) encourage faculty development through instructors sharing their scholarship with first-year students through learner-centered and discovery-based practices;
- 3) create a learning environment in which peers serve as role models of scholarship;

- 4) empower students by allowing them to take ownership of their creative, original ideas;
- 5) foster an environment in which students are encouraged to continue scholarly contributions to their disciplines; and
- 6) integrate research with existing curricular and co-curricular endeavors.

An overarching framework unifies KSP seminars, even as they span diverse academic disciplines. Each major component within the seminar revolves around conducting and presenting research (Figure 1). Utilizing this framework, faculty participants introduce students to an aspect of their own scholarly research and invite students to engage with them in thinking about research possibilities. Next, student teams in each seminar formulate research questions. KSP faculty have found team membership essential to developing collaborative skills among students, refining and perfecting students' ideas, and realizing the full benefits of a learning community. These research teams are also a key component of the seminars, allowing faculty to spend sufficient time working with each group on their hypotheses, research methods, and presentations.

To ensure a sustained impact, programmatic components of KSP extend beyond the first-year seminar course and link students to subsequent research opportunities (McKillip 2009). All participants in KSP write an individual mini-grant proposal as a final academic exercise in their seminars. Within each seminar, the emphasis given to the group and individual projects varies at the faculty member's discretion and is generally influenced by his or her specific discipline. Regardless, the students are all eligible to receive mini-grant funding to conduct the proposed projects over the following term or the summer if they choose to submit their proposals for review by a committee. Ultimately, students who successfully integrate revisions suggested by the committee into their proposals

receive funding for their research projects. Similar to standard grant-acceptance protocol, students are designated as principal investigators (PIs) on their grant awards. KSP alumni may seek additional funding for travel to attend academic conferences and may choose to participate in one of Pepperdine's other undergraduate research programs. Thus, the program is designed to equip KSP alumni to pursue further research opportunities after their first experience.

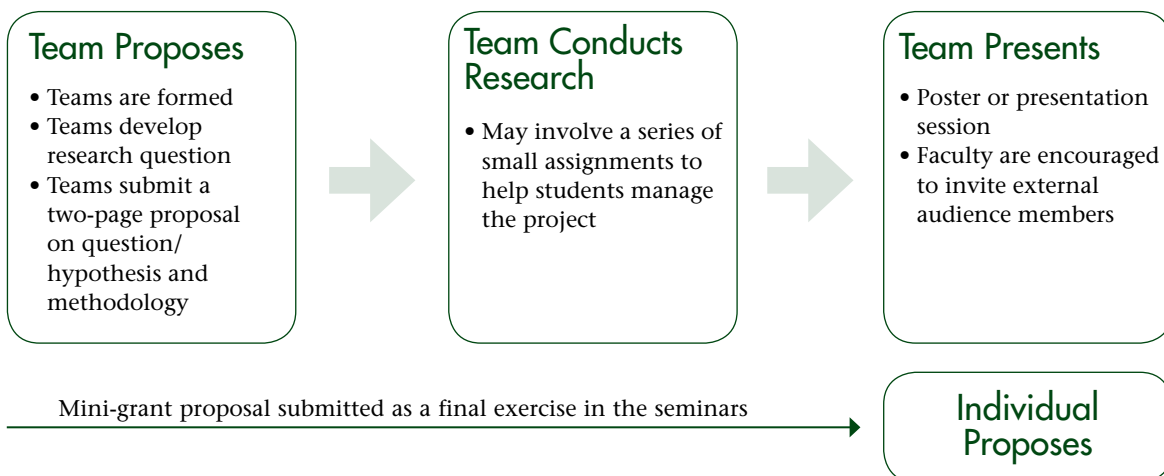
## Program Components and Populations

*Students.* Enrollment in first-year seminars occurs during the summer prior to the start of the academic year. At Pepperdine, students rank their top three seminar choices, selected from offerings in three categories: first-year seminars on a variety of topics, colloquia that would extend beyond the first term (e.g., seminars titled Great Books, or Social Action and Justice), or KSP seminars. None of the offerings in the first two categories include research as a central component. In the first year of the Keck Scholars Program, 142 students enrolled in KSP first-year seminars, and in the second year 162 students enrolled.

Early in the fall term, faculty form, or allow students to form, research teams of three to four researchers. Content introduced early in the term situates students in a particular sub-discipline in which they are free to explore potential research topics. Students in the seminars learn to investigate a topic of interest, to develop research projects, and finally to present results to one another and to a broader university audience. The format for the presentations varies according to the particular disciplines and is intended to replicate what one might find at a national or regional academic conference.

In preparation for their final presentations, students now are required to attend the Southern California Conferences for Undergraduate Research (SCCUR) held annually in November. This one-day, regional conference welcomes all disciplines, is appropriate for entry-level presentations and first-year stu-

**Figure 1 – The Keck Scholars Program Seminar Framework**



dents, and provides peer-reviewed feedback on abstract submissions prior to final abstract acceptance (Swift et al. 2012). By attending, KSP students are exposed to an academic conference and can witness their peers disseminating the products of their research. In the subsequent fall semester, KSP alumni are encouraged to present their research at SCCUR either in the form of an oral seminar, poster presentation, artistic performance, or artistic display.

As mentioned above, along with their team’s research project, as a final assignment each student crafts a mini-grant proposal for a hypothetical project. Students apply the knowledge they have gained and demonstrate mastery of the thought processes necessary to formulate a research question. The mini-grant proposal includes methods, a timeline, a budget, and the significance of the project to the discipline and the student’s scholarly career. Students who are interested in conducting their proposed research the following term or summer have the option of submitting their proposals for consideration for funding. In the first year, more than 50 of the 142 KSP students submitted mini-grant proposals, all of which were offered funding. A selection of project titles appears in Table 1.

**Table 1. Selected Keck Mini-Grant Research Project Titles**

Student Proposes
Nixon/Boone: The Unlikely Friendship of Two Icons
What You Don’t Know Will Certainly Hurt You: A Study into the Impact of Early Financial Education on Financial Behavior and Dispositions
A Study of Arch Height in Shod Versus Unshod Runners
How International Students React to Common U.S. College Social-Cultural Situations
iPads and Group Work: Exploring how the Integration of the Apple iPad into Cooperative Learning Affects Student Comprehension and Retention of Curriculum
The Set Point Theory and Subjective Well-Being of College Students
Athletic Body Image: Comparing Body Image Between Social and Sport Settings in Water Athletes
Michaëlle de Verteuil: Altering Her Life to Change Others
Effects of the Presence of UV Radiation on Feeding Behavior of Dendrobatidae Frogs
Forgive Me, I’m Fat: The Relationship Between Sympathy and Physical Appearance Stereotypes

*Faculty.* KSP faculty attempt to replace the traditional wedge driven between faculty research and teaching with a new bridge that unites their research with their students’ learning. This occurs at the most impressionable moment of a student’s four-year experience, his or her first semester in college. Faculty mentors bring emerging issues to the attention of

students, thereby increasing the potential to advance current knowledge. Students benefit from an early introduction to the rigor of academic scholarship; faculty benefit from devising innovative methods that engage first-year students in original, creative research. By working collaboratively and consistently throughout the semester with the undergraduate researchers, faculty members have the opportunity to stay abreast of the current literature in their discipline, which can, in turn, help to advance their own scholarship.

For example, the KSP seminar in plant biology, entitled “Plant Adaptations to Wildfires,” focused on the mechanical adaptations of plants to water stress because water is the factor most restricting plant survival in arid landscapes in California. Mechanical resistance of native plants to water stress is an emerging field of investigation and is of particular interest to Stephen Davis, the seminar’s instructor. Another example was the KSP seminar in teacher education entitled “Discovering the Secret to Inspirational Teaching.” In this seminar, one research team chose to investigate an emerging issue in educational technology, titling their project “Teachers’ Perceptions of Integrating iPads into their Middle School and High School Classrooms.” This topic complemented the research efforts and interests of their faculty mentor, Stella Erbes. These two examples, from very different KSP seminars, serve to illustrate the common elements of research and how scholarship can be shared by faculty.

Up to ten faculty members, drawn from eight divisions, are recruited for KSP each year. Besides broad disciplinary representation, selection of faculty is based upon: 1) faculty aptitude and willingness to adapt professional approaches to scholarship for first-year students; 2) faculty willingness to provide guidance while encouraging student ownership of original research ideas; and 3) personal engagement and scholarly activity of faculty within their discipline. Further, faculty participants are expected to exemplify teamwork and interdependence within and across sub-disciplines.

Before the first year of the program, participating faculty attended five teaching seminars organized by the project’s directors. These seminars included discussions on assigned readings about collaborative undergraduate research and development of shared learning outcomes, as well as dialogue on how to organize and facilitate a research course. Since the program was launched, KSP faculty have met regularly to compare notes and to share best practices across disciplines. Participating faculty are also encouraged to share their best practices and pedagogical outcomes with other academics beyond Seaver College, either at educational workshops or in the educational section of academic conferences.

*Peer Mentors.* The role played by peer mentors in KSP is also critical to the program’s success. Two peer mentors are selected by each participating faculty member on the basis of the peer mentor’s prior research or teaching experience in the discipline. Mentors receive a modest stipend to attend every class session, provide advice and feedback on research ideas,



*Taylor Stucky is an example of both a first-year student and a subsequent peer mentor in KSP. In the fall of 2011 she was a participant in KSP as a first-year student and, A) reported on her research findings during a poster session; B) she was awarded a mini-grant to continue her research on poison dart frogs; and C) served as a peer mentor to guide a new cadre of KSP-students during the fall semester of 2012. (Photo credit: Stephen D. Davis)*

help with methods and logistics, and attend SCCUR and the seminar's final poster or oral presentation session. In the second year of the program, peer mentors could be drawn from sophomores who participated in KSP as first-year students. In addition to bringing first-hand familiarity with KSP, they are also able to empathize and provide advice to first-year students newly immersed in research, scholarship, and creative activity. Our experience suggests that an ideal combination of mentors would be one junior or senior and one sophomore who had participated in KSP.

### Assessment Overview

KSP students, peer mentors, and faculty complete mid-program and post-program surveys in which they are asked to report on their experiences in the seminar by rating items on Likert scales and responding to ranking and open-ended questions.

The survey questions for students are grounded in the works of Kardash (2000) and Erbes (2008) and ask respondents to report their abilities for planning, analyzing, and communicating research before and after their undergraduate research experience. Assessment data based on survey results after the first year of the program (Table 2) indicate that in eight out of nine sections of the KSP seminar students reported, a significant increase in growth in their abilities to design an original research study (N=124). In six out of nine sections they also reported significant growth in their perceived abilities to locate current research studies relevant to any research topic (N=124). On the other hand, the data did not demonstrate a statistically significant growth in students' perceptions of their abilities to analyze or communicate research. In eight out of nine sections of the seminar, the results did not show a statistically significant increase in students' perceived abilities to demonstrate problem-solving or critical thinking skills when carrying out a research project. Similarly, in seven out of nine sections, no statistically significant increase was reported in

students' perceptions of their ability to interpret research findings appropriate to a research topic.

This minimal growth in students' perceptions of their abilities to analyze research may be attributed to the challenges created from a combination of factors in the first year of the Keck Scholars Program. These challenges included professors learning how to plan and pace the activities effectively for this research-intensive course, the limited time that students have to invest in the research during the semester while managing the responsibilities of their regular course loads, and the students' inability to dig deep into their research given the time restrictions of one semester.

Eight out of nine sections also did not report statistically significant growth in students' perceived ability to communicate clearly in oral presentations, and seven out of nine sections did not report statistically significant growth in perceived ability to communicate effectively in written discourse. These findings prompted us to look at how communicating research is formally taught in the KSP seminars and to investigate what prior experiences or training can be attributed to students' perceptions of their abilities to communicate research. Post-surveys revealed that 90 percent of students found the mini-grant proposal assignment to be somewhat or extremely useful. The number of students who are interested in attending graduate school remained constant in both mid-program and post-program surveys, with 72 percent showing interest in continuing their education.

At the faculty level, three program components were helpful to faculty teaching KSP seminars: participation in faculty workshops, collaboration among KSP faculty members, and the participation of peer mentors (eight of nine faculty members reported that each of these aspects was helpful) after the first year of the program. The Likert-scale questions for faculty asked them to rate how important the research experience was in helping students develop the skills for planning, analyzing,



**Table 2. Self-perceptions of Student Research Abilities (n=124)**

**Table 2: Self-Perceptions of Student Research Abilities (n=124)**

Scale: Exceptionally Capable (5); Considerably Capable (4); Adequately Capable (3); Relatively Capable (2); Slightly Capable (1); Not applicable (0)

	To what extent do you feel capable of:	Section	N	Mid-Average	Mid SD	Post-Average	Post SD	p value < .05	Statistically Significant
Planning Research	1. <i>Designing</i> an original research study?	1	13	2.92	0.86	3.92	0.76	0.001	*
		2	10	2.9	1.29	3.3	0.823	0.309	
		3	13	2.54	0.88	3.46	1.05	0.021	*
		4	14	3.29	0.99	4.07	0.475	0.035	*
		5	15	3.07	1.1	4.13	0.743	0.001	*
		6	14	2.29	1.07	3.5	1.019	0.001	*
		7	15	3	0.93	3.93	0.704	0.002	*
		8	16	2.25	0.93	3.69	0.479	0.000	*
		9	14	2.64	0.84	3.71	0.726	0.001	*
	2. <i>Locating current research</i> studies relevant to any research topic?	1	13	3.54	0.78	3.92	0.641	0.175	
		2	10	2.9	1.1	3.5	1.08	0.024	*
		3	13	3.08	0.86	3.85	0.899	0.054	
		4	14	3.64	0.63	4.29	0.726	0.013	*
		5	15	4	0.93	4.47	0.516	0.029	*
		6	14	2.71	1.07	3.64	1.216	0.001	*
		7	15	3.8	0.86	4.27	0.961	0.11	
		8	16	3.69	0.87	4.25	0.683	0.014	*
		9	14	3	0.88	4.07	0.917	0.002	*
Analyzing Research	3. <i>Demonstrating problem-solving or critical thinking skills</i> when carrying out a research project?	1	13	3.46	0.78	3.85	0.801	0.24	
		2	10	3.6	0.84	3.6	0.843	1	
		3	13	3.38	0.96	3.62	0.87	0.427	
		4	14	3.79	0.7	4	0.679	0.336	
		5	15	3.6	0.51	3.93	0.704	0.136	
		6	14	3.43	0.94	3.64	1.008	0.426	
		7	15	3.67	1.05	3.73	0.799	0.806	
		8	16	3.19	0.83	3.62	0.719	0.048	*
		9	14	3.43	0.65	3.86	0.663	0.054	
	4. <i>Interpreting research</i> findings appropriate to a research topic?	1	13	3.23	0.73	4	0.913	0.026	*
		2	10	3.5	1.08	3.7	0.823	0.555	
		3	13	2.92	1.04	3.46	0.877	0.11	
		4	14	3.36	0.75	4	0.555	0.033	*
		5	15	3.93	0.7	3.87	0.834	0.774	
		6	14	3.21	0.8	3.79	0.975	0.071	
		7	15	3.8	1.01	3.93	0.594	0.634	
		8	16	3.38	0.81	3.81	0.655	0.11	
		9	14	3.07	0.62	3.64	1.008	0.088	
Communicating Research	5. <i>Communicating</i> clearly in well-organized and persuasive <i>oral</i> presentations?	1	13	3.31	1.03	4	0.913	0.006	*
		2	10	3.3	1.16	3.8	0.919	0.096	
		3	13	3.15	0.8	3.62	0.65	0.082	
		4	14	3.71	0.73	4.14	0.535	0.082	
		5	15	3.2	0.94	3.53	0.743	0.29	
		6	14	3.36	1.01	3.57	1.089	0.189	
		7	15	3.87	0.99	4	0.926	0.61	
		8	16	3.75	0.93	4.12	0.719	0.054	
		9	14	3.71	0.99	4	0.877	0.365	
	6. <i>Communicating</i> effectively in well-organized and clear <i>written</i> discourse?	1	13	3.15	0.9	4.08	0.76	0.004	*
		2	10	3.3	1.06	3.7	0.949	0.223	
		3	13	3.38	0.65	3.77	0.832	0.096	
		4	14	3.5	0.65	3.79	0.893	0.365	
		5	15	3.6	0.91	3.93	0.594	0.096	
		6	14	3.21	0.89	3.86	0.949	0.045	*
		7	15	4	0.66	4.33	0.724	0.136	
		8	16	3.44	0.73	3.69	0.479	0.164	
		9	14	3.14	0.77	3.71	1.069	0.15	



First-year students in a KSP course who are investigating the biological mechanism of plant adaptation to wildfire in the Santa Monica Mountains. Students shown are measuring enhanced photosynthesis and transpiration characteristic of fire-adapted plants after shoot removal by wildfire. (Photo credit: Stephen D. Davis)

and communicating research. Six out of nine faculty said that designing an original research study was very important, and eight out of nine (88 percent) said they felt having students locate current research studies was moderately to very important. Faculty were also asked to rank the outcomes of undergraduate research in order of importance (choices included participating in the research process, contributing to the field of study, and motivating students to attain a higher level of education or commit to a research-related career).

All 17 peer mentors completed surveys in the first year of the program, and the data reveal they were extremely satisfied (4.5 on a 5-point scale) and had their expectations met from their participation in the program. This was the only Likert-scale question on the surveys of peer mentors. Most of the questions for mentors addressed their prior experiences and future goals. Ten out of 17 mentors (59 percent) reported that their participation as a research mentor reinforced their decision to attend graduate school. Interestingly, the stipend promised to peer mentors was the least important factor in determining their participation. Peer mentors reported that gaining teaching experience and enhancing their résumés were the primary reasons they decided to participate.

### Post-Implementation Insights

Based on experience with the program, some unexpected benefits, unforeseen challenges, and best practices for future implementation have emerged. Project directors found debriefing sessions with faculty participants to be beneficial and plan to continue these meetings in subsequent years.

Especially helpful during these sessions were collegial discussions about the nature of research within diverse disciplines. Faculty shared their processes for determining what the products of student research should look like in their respective disciplines. For example, this year's art history students curated museum exhibits, while history students developed outlines of the biographies they hypothetically would write. KSP has deepened mutual respect among faculty across disciplines as they wrestle with pedagogical decisions and share outcomes with one another.

In teaching the seminars, faculty had to learn to balance the research-intensive elements of the course and the generic first-year seminar requirements that orient students to college life. Faculty benefited from sharing syllabi with one another prior to the first year, which allowed them to conceive of how best to incorporate the traditional first-year seminar's learning outcomes with the desired research learning outcomes. At the beginning of the semester, faculty needed to be organized so that research skills were clearly introduced early in the semester, helping prepare students for the workload ahead.

Faculty initially were unsure of how to include peer mentors effectively in their plans for the seminars. They questioned how they could utilize peer mentors during and outside of class and what responsibilities the mentors should be given. Through trial and error and conversations with one another,

**Table 3. Peer mentor activities and the corresponding percentages of the 17 mentors' participation.**

Activity	# participate	% participate
Met individually with research groups	15	88%
Assisted groups with formulating a research question	16	94%
Assisted with finding resources	14	82%
Assisted groups with research designs	15	88%
Helped groups with problem-solving as it related to the research process	15	88%
Assisted groups with oral presentation skills	8	47%
Assisted groups with written presentation skills	9	53%
Reviewed research proposals along with the seminar professor	15	88%
Taught the whole group	9	53%
Graded papers	11	65%

Other:

Reviewed journals weekly (2); developed grading rubrics (1); reviewed games for exams, tips of the week, review sheets (2); helped with SPSS and Excel (1).



While on a field trip to the San Onofre Nuclear Power Generating Station in San Onofre, CA, first-year students in a KSP course entitled "Communication Meltdown? Exploring the Challenges of Nuclear Discourse" learn about the challenges and possibilities associated with communication about nuclear issues.

faculty developed best practices for involving peer mentors (Table 3). Nearly all peer mentors were involved in assisting student research groups with formulating a research question. At least 15 out of the 17 peer mentors reviewed research proposals with the seminar professor and assisted student research groups with problem-solving and developing research designs.

### **Sustainability, Transferability**

Sustainability of KSP, funded in part by a three-year grant from the W. M. Keck Foundation, was always at the forefront of the program's design. Pepperdine's commitment to broadening support for a research-rich culture provides the institutional commitment to implement a program of this scope and nature. This is central to sustaining the program in the future. Project directors cultivated "buy-in," not only from faculty who were both willing and interested in teaching a new first-year, research-intensive course, but also from representatives from academic divisions, the dean, and other key stakeholders. Each year KSP will continue to incorporate the faculty expertise that has developed in the earlier years. With this significant investment of personnel, we anticipate that this program will become an established part of the institution's first-year seminar curriculum.

First-year seminars are common among colleges and universities in the United States; 95 percent of four-year institutions have them (Goodman and Pascarella 2006, 26). The KSP should be transferable to almost any institution that has first-year seminars. While the goals of first-year seminars may vary across institutions, one common shared goal is increasing students' academic performance. Students currently enrolled in

KSP may or may not have chosen to participate in a research-intensive course as a first choice for their first-year seminar. It might have been their second or third choice. As a result, this may impact the extent of their subsequent engagement in research, and it creates a potential challenge for faculty. Yet even if students do not choose to pursue research opportunities after their first-year seminar, current literature indicates that participating in research helps students become better students (Lopatto 2010). Nonetheless, other institutions may want to consider creating seminars on the basis of demand for the seminars.

### **Conclusions**

KSP both enhances and complements the general-education requirements in the context of a liberal arts education. When students are challenged to engage in personal research, scholarly work, and creative activity, they actively make use of all resources available to them in order to test hypotheses, answer questions, defend theses, and/or create artistic expression. Because students experience this process first-hand in KSP, we are now convinced of the importance of offering first-year research-intensive seminar courses within the general-education curriculum. Regardless of a student's discipline, scholarly work requires astute reasoning ability, clarity of oral and written communication, critical thinking and problem solving skills, quantitative ability, and creative, original expression. KSP students quickly realize that these broad skills complement the technical and theoretical training they receive in their specialized majors.

Through the assistance of KSP faculty, the scholarly contributions of first-year students can eventually lead to transformative ideas, paradigm shifts, and a distinctive advancement of new knowledge. A few examples of 19-year-olds who have made a significant impact in the past are Charles Darwin, Richard Henry Dana, Jr., Bill Gates, and Mark Zuckerberg (Darwin 1887; Dana 1840). The benefit of KSP for faculty participants is an added dimension to their research, scholarly work, or creative activity. This is accomplished by involving inexperienced students who often bring fresh perspectives, without preconceived notions, to pressing needs and emerging issues. The ideas of first-year students are often more creative, novel, adventuresome, and far less constrained than those of professionals.

The full benefits of KSP may not be realized until the students who have participated in the program reach their senior year. For our first cohort of KSP students, this remains two years in the future. At the time of their graduation, we anticipate greater student satisfaction with their undergraduate experiences and a significant increase in their scholarly productivity, measured by research conference presentations, visual and performing art expressions, publications in refereed journals, applications for graduate fellowships, and receipt of Fulbright awards or acceptance to prestigious internship programs. Because KSP students have started their scholarly activity in their first year of college, they will certainly have more experi-

ence and a longer track record to reference in their applications for grant awards, fellowships, and competitive positions in graduate and professional schools. Evidence thus far indicates that through integrating research into the first-year general-education curriculum, KSP provides a viable model for increasing scholarship activity among undergraduates.

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