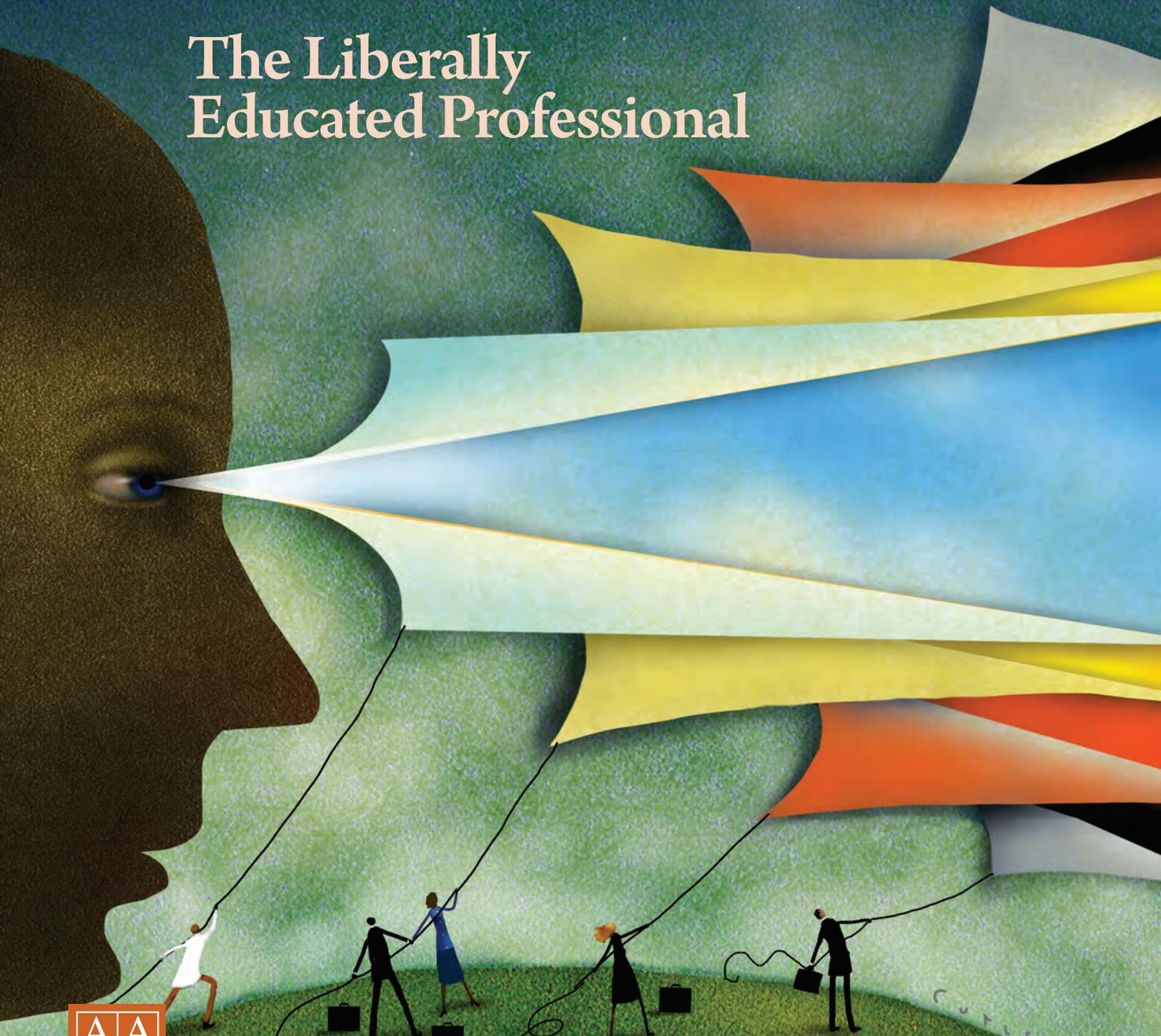


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# peerReview

EMERGING TRENDS AND KEY DEBATES IN UNDERGRADUATE EDUCATION

## The Liberally Educated Professional



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# CONTENTS

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## SPRING 2012

**From the Editor** . . . . .3

## ANALYSIS

### Presidential Views on the Liberally Educated Professional

An interview with **Michael Bassis**, Westminster College (Utah); **Christopher Dahl**, State University of New York, Geneseo; **Helen Giles-Gee**, Keene State College; and

**Richard Guarasci**, Wagner College . . . . .4

## PRACTICE

### Designing the Liberally Educated Engineer

**Richard F. Vaz**, Worcester Polytechnic Institute . . . . .8

### The Role of Liberal Education in Preparing Tomorrow's Teachers

**Jan Riggsbee**, **David Malone**, and **Matthew Straus**, Duke University . . . . .12

### Navigating the Perfect Storm: Nursing and Liberal Education

**Mary-Ellen Fleeger** and **Thomas W. Connelly, Jr.**, Keene State College . . . . .16

### Integrating Pharmacy and the Health Sciences with Liberal Education

**Raylene M. Rospond**, Drake University . . . . .20

### For the Professional and for All: Toward Liberal Education in Public Health

**Susan Albertine**, Association of American Colleges and Universities;  
**Donna J. Petersen**, University of South Florida; and **Christine Plepys**,  
Association of Schools of Public Health . . . . .24

## RESEARCH

### Business Education and Liberal Learning

**Julie Kliegl**, Wartburg College, and **Kari D. Weaver**, University of  
South Carolina Aiken. . . . .28

## REALITY CHECK

### Liberal Education Complements Engineering

**Ronit Patnaik**, Purdue University . . . . .31

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For many years, the Association of American Colleges and Universities (AAC&U) has advocated for *all* students to attain, what we have come to call, the Essential Learning Outcomes—a broad set of capabilities and perspectives needed to prepare them for the complexities of the twenty-first-century world. In *College Learning for the New Global Century*, AAC&U's LEAP National Leadership Council contends that “the new economic reality is that narrow preparation in a single area ... is exactly the opposite of what graduates need from college. Study-in-depth remains an important part of the overall pattern for college learning. But students deserve to know that focusing only on one specialty is far from enough.”

In this era when advertisements on television, in the newspapers, and on the sides of city buses proclaim that the guaranteed path to success is through narrow vocational studies, many institutions are, instead, going against that trend and taking their lead from what employers actually say they want—broadening their professional programs' curricula in order to liberally educate all their students. And these are the type of graduates that employers are interested in hiring. AAC&U's multiple surveys show that employers want “liberally educated professionals.” In a 2007 survey, 56 percent of business executives said that they recommend to students a balance of both a well-rounded education with broad knowledge and skills that apply to a variety of fields, and knowledge and skills in a specific field.

Editing this issue brought to mind my first lesson on how important and life changing a broad education can be—learned though the example of my parents' courtship. When my mother and father met, she was beginning her sophomore year as an art student in Howard University's liberal arts program and he was a senior in the school of engineering. After dating for a few months, my mother pronounced him “boring” because everything he talked about centered on engineering. She recommended that, to widen his perspective, he should enroll in elective literature and history classes in his last semester. He did as suggested and, with this knowledge, his conversational skills increased and a lifelong learner was born. Eventually he became a medical doctor, and my

mother still attributes his ability to relate to and communicate so well with his family practice patients, who came from all walks of life, to his willingness to learn more about and engage the world beyond engineering.

While making intellectual connections beyond one's chosen profession has always been important, in today's world these outcomes are critical. This issue of *Peer Review* features best practices from a range of innovative programs that go beyond limited professional training to produce liberally educated professionals:

- Through its signature WPI Plan, Worcester Polytechnic Institute engineering students “form a deep appreciation of the interrelationships among basic knowledge, technological advance, and human need.”
- Duke University's education program endeavors to “find ways to build on and integrate the liberal education experience that undergraduates bring with them to the teacher preparation program.”
- Keene State College's new nursing program—anchored in the liberal education mission of the college—prepares its graduates with the knowledge, skills, and attitudes to “weather the storm changes in health care.”
- Drake University requires all pharmacy students to fulfill the Drake Curriculum, a liberal education component that goes beyond standard pre-pharmacy prerequisites.
- A Wartburg College study shows that business students who undertake complex assignments improve performance on multiple liberal education dimensions.

All articles in this issue provide multiple perspectives on the necessity of liberally educating our next generation of professionals. As Debra Humphreys expressed in *Making the Case for Liberal Education*, “All students need the knowledge, skills, and capacities developed by a liberal education. Today's students are likely to change jobs and even careers several times over the course of their lives. If they pursue too narrow an undergraduate education, they will be unprepared for dealing with change—the predominant characteristic of today's economy and tomorrow's jobs.”

—SHELLEY JOHNSON CAREY

# Presidential Views on the Liberally Educated Professional

► To set the context for this issue of Peer Review and to get a sense of how leaders from a range of institutions are working to create effective programs and practices to graduate liberally educated professionals, we asked **Michael Bassis**, president of Westminster College (Utah); **Christopher Dahl**, president of State University of New York, Geneseo; **Helen Giles-Gee**, president of Keene State College; and **Richard Guarasci**, president of Wagner College, to share their thoughts on this topic.

**“What we need is more big picture thinking in the professions and more real-world experience in the liberal arts.”**

**Steven Weiss (1935–2008)**  
Former Managing Director, Neuberger Berman LLC

**Do you agree with Steven Weiss’s quote and, if so, how are you advancing more big picture thinking in your institution’s professional programs?**

**BASSIS**—At Westminster, we think about “big picture thinking in the professions” in the exact same way we think about big picture thinking in the liberal arts. We start with the premise that we want all of our graduates, regardless of their field of study, to develop skills to be successful both in their careers and in their lives beyond. We believe that those skills are ones that help one to understand, for example, that some questions are more important than others, that multiple perspectives bring richer understandings, that the whole is often greater than the sum of its parts, that there is much to learn from diversity, and that ethics matter. As our economy continues to evolve, our graduates will need to have skill sets that are not only valuable as conditions change but transferrable for use in the multiple careers they are likely to have and the variety of roles they will play beyond the workplace. The Westminster faculty believe they have identified specific skills and attributes that meet this test. As a consequence, they adopted them as College-Wide Learning Goals that they want all of our graduates to achieve. They include critical, analytical and integrative thinking; creative and reflective capacities; leadership; collaboration and teamwork; writing and other commu-

nication skills; and global consciousness, social responsibility, and ethical awareness. Beyond that, the faculty have developed specific rubrics which, when combined with a requirement that all students complete an e-portfolio to demonstrate their learning, allow them to evaluate, over time, each student’s progress in achieving these learning goals.

**DAHL**—I agree. We certainly need more big-picture thinking in the professions and more real-world experience in the liberal arts. But I also think that Weiss’s remarks preserve what might be called the myth of the functional dichotomy between the liberal arts and the professions. The original *artes liberales*—the *quadrivium* and *trivium* of the ancient world—were practical in a very real sense. They were the arts of free people (as opposed to slaves), intended to prepare such people—admittedly a very small elite—for civic discourse and full participation in the society of the time. Our contemporary concepts of liberal education, as expressed in *The LEAP Vision for Learning*, for example, are intended to break down stereotypical distinctions between liberal arts and professional fields, especially when they are carried out with sufficient intentionality and power. AAC&U’s 2003 study of the crosswalks between the Greater Expectations outcomes and the requirements of professional accrediting bodies reminded me of something I have observed as an arts and sciences dean and provost working with professional programs: in practice, an AACSB-accredited business administration program may be more “liberal” in the learning outcomes it calls for than programs in traditional arts and sciences fields like English or chemistry. In a residential public liberal arts college like Geneseo, this may be so because we require professional programs to think about what it means to be a professional program in our setting.

We don't ask the same of traditional arts and sciences programs. Because we are a residential liberal arts college that seeks to leverage the connections between the curriculum and the cocurriculum and also between service learning and economic development, we naturally encourage big-picture thinking. Thanks to a recent major gift for an endowed chair in entrepreneurship, we have a new, highly specific opportunity to encourage such thinking. Rather than isolating the professorship in our School of Business, we have defined it as a college-wide position—a business professorship designed to study and promote entrepreneurship as a liberal art.

**GILES-GEE**—I appreciate the duality of Weiss's quote as it recognizes the value of application and practice in the professions and the broad ranging abilities and knowledge developed through the liberal arts. At Keene State College, all professional programs have at their core an integrative general education program, which has imbedded the knowledge and cognitive abilities within the liberal arts that promote "big picture thinking." We promote the idea that the development of knowledge that applies across a variety of professions expands the capacity of graduates to adapt to a changing and global world. In addition, Keene State College brings real-world experience to our liberal arts programs. Students are presented with opportunities to partner with community organizations to conduct research and project-based work that helps them hone skills in their chosen field.

**GUARASCI**—I also agree with Weiss's quote. At Wagner we integrate the professional programs and traditional liberal arts by requiring all students to complete three learning communities that are lodged in the liberal arts. This is part of the Wagner Plan for The Practical Liberal Arts, introduced as required for all students in

1998. Our curriculum links experiential and civic learning with course clusters consisting of two disciplinary courses and a reflective tutorial taught exclusively to a common student cohort. For professional program students this regularly integrates liberal arts and professional program courses (e.g., chemistry and nursing, sociology and business, history and education, etc.). The field component requirements which are natural for the professional programs allow us to introduce the practical application dimension for the traditional arts and sciences (e.g. English majors providing textual and interpretive reading for senior centers; history majors engaged in field work in public history for museums, library audiences, nonprofit organizations, etc.).

#### **Why do you think employers are seeking liberally educated professionals?**

**GILES-GEE**—In February 2012, Keene State College held a roundtable with New Hampshire business leaders in such areas as manufacturing, insurance, human resources, and general contracting. Facilitated by the CEO of the New Hampshire High Tech Council, business leaders were asked what they considered to be the most valuable skills to consider when hiring individuals who are just out of college. A summary of their responses included a desire for college graduates who possess the ability to write; interpersonal/communication skills; hands-on experience, problem-solving skills and study skills; the ability to think about best ways to apply knowledge, as opposed to just applying it; business understanding (real-world understanding); consultative skills (knowing how to work with clients); strategic/conceptualization skills (seeing the big picture); internship experience in solving problems; an understanding of the need for continuous self-development; the ability to be a team player; flexibility;

and the capability to deal with difficult people and resolve conflicts. The vice president for advancement paraphrased these responses in this way: the employers want employees who can adapt over time, be self-directed, and continue to be relevant within the workplace as customers and products change. I agree with her assessment. Liberal arts programs provide graduates with the skills and knowledge to address these various and at times competing demands. At Keene State College we apply feedback from employers to our programs to ensure that our graduates receive the education they need for success.

**BASSIS**—It's clear from surveys of employers that they are generally satisfied with the subject-specific knowledge and skills of most graduates of professional programs. Accounting majors know how to balance the books and those majoring in nursing know their way around the hospital. At the same time, however, they are dismayed with the inability of those same graduates to write a coherent memo, work as part of a team, work with people with different backgrounds and values, think creatively and critically, assume a leadership role... the list goes on. For years we have thought that the way to fix that problem was to ask students to take more courses in the liberal arts. But the criticisms about what our graduates have failed to learn apply as much to those who major in the liberal arts as they do to those majoring in professional fields. It's no secret that some liberal arts programs, like many in our professional schools, operate as silos where the goal is to pass on a narrow range of discipline-specific knowledge and skills. The issue is not what one studies but what skills our students take away with them from their studies. The liberally educated professionals that employers are seeking could major in almost any field. But whatever



the field, they would have to acquire knowledge, skills, and attributes similar to the Essential Learning Outcomes of AAC&U's LEAP project.

**DAHL**—Surveys conducted for AAC&U by Hart Research Associates have confirmed what many of us have observed on the ground: today's employers are looking for college graduates who are well prepared for the challenges of a global economy, who are culturally fluent, and who work well in teams and are able to solve problems in rapidly changing environments. Outcomes of this sort are fostered best by liberal education; reassuringly, they closely track the LEAP Essential Learning Outcomes. As I speak with employers in our region, I hear the same things, and, interestingly, I hear them most often from leaders in business and accounting. They tell me they value Geneseo graduates for their character, their work ethic, their cultural competence, and their ability to deal with a wide range of clients. I have taken to calling these liberal learning outcomes “the Geneseo liberal arts advantage.”

**GUARASCI**—The research data and our immediate experience in career development placements demonstrate vividly the desire by employers for students and graduates that not only write effectively, think critically, and speak persuasively, but also students who are adept learners capable of locating context and culturally specific norms, and who are comfortable with difference and unscripted problems. The liberal arts provide students with the breadth and depth of the human experience, particularly issues beyond the prism of their personal autobiographies. The field-based learning required for all students at Wagner provides them with experience translating from the general to the specific contexts they find themselves within organizations and communities.

**As president, what is your role in advancing this model of liberally educated professionals and real-world experience for your school's liberal arts majors?**

**GILES-GEE**—First, I continue to learn more from qualitative and quantitative research on the outcomes of student learning and the varying characteristics of a liberal education, so that I can be an advocate who is able to articulate liberal education's possibilities with data to support my points. Second, I garner funds to support faculty development about service learning and “essential learning outcomes” integration into the curriculum. Third, I continue to support the re-visioning of the general education program and its assessment by supporting faculty travel to workshops with their peers. Fourth, and most important, I continue to espouse the liberal arts as the core and application of theory as requisite for all programs, regardless of major.

**BASSIS**—Shortly after I arrived as Westminster's new president almost ten years ago, I started a comprehensive and highly collaborative strategic planning process. I avoided the temptation to propose specific initiatives for inclusion in the plan. I did, however, fertilize the deliberations with information about changing conditions in higher education, changing instructional paradigms, and best practices used at other schools. Some of this information came from outside experts I brought to the campus, but much of it came from my speeches and informal conversations with various campus groups. Just as importantly, before the planning process got underway, I developed a set of design criteria to guide the planning process. Included here was language that called for the plan to develop an educationally distinctive, learning-centered environment that was supportive of both the liberal arts

and professional studies. Then we were fortunate to be invited to join the New American Colleges and Universities, a consortium of private institutions who have joined together by their commitments to the liberal arts, professional studies, and civic responsibility. It was through actions such as these I encouraged the faculty to take advantage of the ways that professional studies and the liberal arts could strengthen each other.

**DAHL**—Geneseo is one of a small number of institutions that explicitly define themselves as public liberal arts colleges. That means I'm an evangelist for liberal learning in public college settings. As president, I return repeatedly to our liberal arts mission as a touchstone, whatever audience I am addressing, internal or external. As we hire senior administrators at Geneseo, we look for liberally educated individuals. Our long-time CFO, for example, was a professor of German who had also worked as a senior student affairs officer. In allocating resources, we always take our mission into account. Our current capital campaign, “Shaping Lives of Purpose,” focuses on the student experience and is designed to support the high-impact educational practices we value as a liberal arts college. In sum, we try to model the connections between liberal learning and the world of practice in all we do as a college. These connections need to be underlined on a daily basis, and as president I do a lot of the underlining. We seek to model humane leadership in the college and prepare humane leaders.

**GUARASCI**—As president, my role is to set and affirm these general parameters for learning and teaching, making sure they are valued in who we hire, tenure, and promote on the faculty and who we hire and sustain on our staff. Secondly, my role requires that I reward, encourage,

and demand a fully integrated educational platform for student learning across the curriculum and cocurriculum. This includes integrating alumni affairs with experiential learning and both the majors and general education faculty and staff. This also requires consistent institutional assessment as well. Finally, I teach a course each semester that models all of these practices.

**Traditionally silos exist on campuses. How are you trying to break down divisions between the professional schools and arts and sciences?**

**GILES-GEE**—The faculty has promoted and embraced team teaching and joint explorations of integrative courses that blend the arts and sciences with professional courses. The use of assessment of some of the “essential learning goals” across all programs has stimulated faculty to consider how writing or quantitative literacy can be incorporated into any major. Some capstone projects have combined majors from varying fields such as architecture, environmental science, and sociology to address different aspects of the same field-based problem as a team (e.g. improvements of a town park). When students and faculty from a variety of professional and liberal arts disciplines come together to solve real-world problems and communities benefit, some of those old silos lose their significance.

**BASSIS**—We believe our College-Wide Learning Goals constitute skills and attributes that are critical to a student’s success following graduation, regardless of their major field of study. Accordingly, we have concluded that every academic program across campus, as well as every cocurricular activity, can and should contribute to student achievement of those goals. We believe that every academic program can help students develop critical skills and attributes that transcend specific subject matter. By agreeing to do so, the Westminster faculty have acknowledged their common interests and concerns and that acknowledgment has worked to break down divisions across our entire spectrum of programs.

**DAHL**—At Geneseo, we have done everything we can to avoid creating silos. In fact, for many years we avoided granting the title of dean to the heads of our two professional schools. Although the deans of business and education are fully empowered (accreditation bodies expect this), they report directly to our provost, along with the chairs of our eighteen arts and sciences departments, and meet regularly in a joint council of deans and chairs. Geneseo’s general education program requires core courses of all students in all fields. We expect faculty from the professions to teach in writing-across-the-curriculum courses. Faculty from business and education regularly teach in our required humanities sequence, and we encourage team-teaching

with faculty outside the professional programs. Over the past decade we’ve been fortunate to attract accounting professors with strong liberal arts backgrounds and teaching interests. We encourage students in arts and sciences fields to declare a minor in business, and are currently trying to provide access to business courses for all students. Many of our business programs, such as our student managed investment fund, are open to students from any field. Looking forward, we regard our college-wide professorship in entrepreneurship as a further tool to break down silos—and an exciting exercise in extending the reach of liberal learning.

**GUARASCI**—The Wagner Plan’s reliance on three required learning communities with experiential or civic components helps our faculty work together consistently across the artificial divides of professional and liberal arts and sciences. In addition to individual three-year teams, faculty meet annually in a three-day retreat and directly discuss many of these issues in various manifestations, and the first-year program faculty participants meet monthly as well. These arenas dilute a good deal of silo culture. In addition, the appropriate cocurriculum and student life leaders are part of all the discussions and dialogues. Common practice is the way to defeat silo thinking and practices. It works from the bottom up when the expectations for learning and teaching are clear, transparent, and valued. ■



# Designing the Liberally Educated Engineer

► **Richard F. Vaz**, dean of Interdisciplinary and Global Studies, Worcester Polytechnic Institute

Our lives are influenced in unmistakable ways by technology. Technological advances have transformed how we communicate, recreate, work, and travel, and have contributed to longer lives for most people on the planet. Meeting the needs of the one billion or so who live without regular access to clean water, sanitation, and electricity will depend on technology developed in locally-appropriate ways, in light of social, political, and economic realities. Scientific discovery may enable technological progress, but it is the engineering profession, through development and application, that actively shapes the world around us.

At the heart of engineering is the act of design: meeting human needs under constraints. Good engineering design requires an understanding of social context—not only users' immediate desires, but also the environmental, ethical, economic, and cultural implications of technology. While science seeks to isolate phenomena from context, engineers tinker in the messy laboratory of society, applying knowledge and tools to open-ended, ill-posed problems. Engineers should understand how technology can shape, and be shaped by, the human condition. Remarkably, we attempt to prepare students for this daunting profession at the baccalaureate level. What chance do engineers stand of receiving a broad, liberal education—and what chance does society stand of a more sustainable future if they don't?

## ENGINEERING EDUCATION: CONTESTED TURF, HIGH STAKES

The history of engineering education has been described as one of “continuous reform,” as tensions between theory and practice, content and skill development, and especially, technical depth and liberal learning have existed since the nineteenth century (Seely 2005). Today, turf battles continue between engineering analysis—the scholarly focus of most engineering faculty at research universities—and engineering design, with its broader context and connection to professional practice. At the institutional level, few programs present more challenges than engineering to balancing general education outcomes with the major. Given the desire to involve the latest technologies and

tools, and a tendency for spinning off new specializations and areas of study, engineering curricula often leave students gasping for air, with little time to pursue nontechnical interests—a narrowness that can deter women and minorities (Busch-Vishniac and Jarosz 2004).

The past two decades have seen progress toward more well-rounded engineering education. *The Accreditation Board for Engineering and Technology's Engineering Criteria 2000* (ABET EC 2000), adopted in 1997, have been highly influential in directing engineering programs toward broader learning outcomes. ABET's criteria require attention to engineering design, and expect programs to demonstrate that students possess abilities in teamwork, communication, awareness of current events, and “the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context” (Accreditation Board for Engineering and Technology 2011). Given the importance of ABET accreditation, programs have broadened in response, especially in the areas of engineering design, teamwork, and communication.

More recently, the National Academy of Engineering (NAE) released “Educating the Engineer of 2020,” part of a multiyear envisioning exercise involving leaders from academia and the public and private sectors (National Academy of Engineering 2005). The report is an ambitious call to augment traditional analytical skills with ingenuity and creativity; communication, business, and leadership skills; ethics, professionalism, and flexibility; and an understanding of the social and global contexts of the profession. Notably, the report recommends that the baccalaureate become a pre-engineering degree emphasizing breadth, and leading to specialization only at the graduate level.

And yet, across the nation, engineering curricula have been slow to change, and reform has been largely at the margins, rather than central to the curriculum. Engineering faculty—often applied scientists rather than designers—tend to protect analytical content in the curriculum, and can view liberal learning as a “soft” pursuit less worthy of attention than more technical material. Employer surveys cite the need for breadth, but corporate representatives

come to campuses demanding experience in the latest specific tools and technologies. Despite the global nature of the engineering profession, engineering students continue to participate in study abroad at low levels. Change, however broadly called for, tends to be incremental rather than systemic.

### THE WPI PLAN: APPLYING KNOWLEDGE IN AUTHENTIC SETTINGS

In the late 1960s, Worcester Polytechnic Institute—an engineering-focused private institution founded in 1865—found itself saddled with a rigid curriculum that left students with few choices and faculty with little room for educational innovation. From this unlikely setting came transformative change, fueled by progressive faculty and supported by a bold president, resulting in adoption of the *WPI Plan* in 1970 (Grogan and Vaz 2003). The plan framed technological education in terms of students' abilities to apply knowledge in authentic settings. The signature elements of the plan were a series of degree-required projects, two of which were focused not on science or engineering but rather on students' grappling with humanistic values and the social contexts of technology.

The philosophy behind the plan, as still articulated in WPI's Goal Statement (WPI 2011), is for students "to form a deep appreciation of the interrelationships among basic knowledge, technological advance, and human need." Required courses, prerequisites, and traditional grades were replaced by a system emphasizing integrative and interdisciplinary learning demonstrated through cooperative, open-ended project work. While the WPI Plan has evolved and matured during its forty years of existence, the fundamental values placed on project-based learning, curricular flexibility, and social and human needs have remained—even as WPI has transformed into a research university.

A key aspect of the WPI Plan is the extent to which learning outcomes and degree requirements are defined at the campus-wide level for students regardless of major. The university's learning outcomes (WPI 2011) specify that graduates of WPI will

1. have a base of knowledge in mathematics, science, and humanistic studies;
2. have mastered fundamental concepts and methods in their principal areas of study;
3. understand and employ current technological tools;
4. be effective in oral, written, and visual communication;
5. function effectively both individually and on teams;
6. be able to identify, analyze, and solve problems creatively through sustained critical investigation;
7. be able to make connections between disciplines and to integrate information from multiple sources;
8. be aware of how their decisions affect and are affected by other individuals separated by time, space, and culture;
9. be aware of personal, societal, and professional ethical standards; and
10. have the skills, diligence, and commitment to excellence needed to engage in lifelong learning.

Outcomes four through ten reflect WPI's focus on curricular breadth, collaborative problem solving, and awareness of societal and global issues. WPI students demonstrate these outcomes primarily through a series of project activities that require them to bring knowledge to bear in practical settings.

### EXPERIENTIAL LEARNING ACROSS THE CURRICULUM

The WPI Plan engages students in open-ended inquiry both in and out of the major field of study, and across the four years. Students are challenged to engage in a series of increasingly complex learning experiences

involving application and integration, teamwork and responsibility, persuasive communication, and understanding the social and cultural contexts of engineering and science. While the program's flexibility creates many options for students to construct unique paths to graduation, five activities form the heart of the WPI Plan.

#### Great Problems Seminars

To introduce first-year students to WPI's emphasis on problem-based learning, the university has organized a set of two-course Great Problems Seminars. In the first of these courses, students explore aspects of a particular challenge facing the world, such as energy, food security, public health, education, or sustainable development. In the second course, students work in small teams to independently research prospective solutions to these problems. Students in the Heal the World seminar have developed recommendations for reducing breast cancer in Uganda, studied efficiency challenges in US healthcare delivery, and developed smoking cessation programs for the WPI campus. Feed the World projects have addressed malnutrition in elderly Worcester residents, promotion of polyculture into mainstream farming, and the impacts of food additives on children's health.

Each Great Problems Seminar is cotaught by two faculty members, typically one from engineering or science and the other from the humanities, business, or social science. The faculty work as a team, cofacilitating the course to make clear the interdisciplinary nature of the problem. Despite the breadth of focus areas, all the seminars have the same goals: "engagement with current events, societal problems, and human needs; critical thinking, information literacy, and evidence-based writing; and development of professional skills including effective teamwork, time management, organization, and personal responsibility" (Wobbe, Savilonis, and Spanagel 2010). Through independent project work,



students develop a goal or thesis, conduct original research, and present their results in written and oral formats. The seminars culminate in a campus-wide event in which the first-year students present and defend their work in a judged poster presentation forum.

### **Humanities and Arts Requirement**

The WPI Plan asks students to choose a *specific area of focus* in the humanities and arts, toward the goal of creating a life-long engagement with that area. Akin to a minor, the requirement involves a set of courses chosen by the student that culminates in a seminar or practicum in which students do original work, such as a research paper, original composition, or other creative endeavor under the guidance of a faculty member. The requirement also has a modest breadth component, but no specific courses or disciplines are mandatory—students design their own programs according to their interests. The goals include self-knowledge, independent thinking, and communication, but in particular emphasize critical inquiry and the ability to apply concepts and skills in a particular area of the humanities or the arts.

Students might pursue coursework in the history of science, and then write a research paper investigating the influence of a certain scientific development on political or cultural forces. Students focusing in music will often compose and perform original work. Studies in Arabic language and culture may culminate in cultural research conducted in Morocco. The requirement is for eighteen credit hours of work in the humanities and arts; some students pursue considerably more.

### **Interactive Qualifying Project**

The most distinctive element of the WPI Plan, the Interactive Qualifying Project (IQP) is a nine-credit-hour interdisciplinary requirement involving applied research connecting science or technology with social

issues and human needs. The intent of the requirement is for WPI's students, most of whom aspire to be engineers or scientists, to better understand the cultural and social contexts of those fields, and thus be more effective and socially responsible practitioners and citizens. Faculty members from all disciplines are involved in advising IQPs.

The IQP is not organized as a course, nor is it related to the major; small teams of students work under faculty guidance to conduct research, often using social science methods, directed at a particular problem, typically posed by a not-for-profit organization or government agency. Students deliver findings and recommendations through formal reports and oral presentations to the sponsors and faculty advisors. About half of all IQPs are completed off-campus through the Global Perspective Program, as explained below.

Sustainability serves as a common theme for IQPs, many of which address problems related to energy, environment, sustainable development, education, cultural preservation, and technology policy. IQPs completed in Cape Town, South Africa, focus on community capacity building, energy sustainability, and water resource management. In Washington, DC, students recommend new policies to the Consumer Products Safety Commission and help the National Science Foundation evaluate the impact and effectiveness of its programs. In WPI's home city of Worcester, students have worked with an AIDS support organization to develop community gardens to improve nutrition, and conducted a study that resulted in a local school erecting a 600-kilowatt wind turbine to meet all its energy needs.

### **Major Qualifying Project**

Building on the IQP, the Major Qualifying Project (MQP) is also a nine-credit-hour requirement in which small teams of students work under faculty direction to do original work. This project is completed

in the student's major; for engineers, the MQP usually involves a design project or applied research. Students use what they have learned, both in the major and across the curriculum, to tackle a problem in their primary area of study. MQPs are often completed with corporate sponsors or research laboratories, and are intended to be similar to the assignments in a first engineering job. In addition to whatever system, solution, or device is responsive to the problem, students develop a formal written report and present their work in oral form as well.

Learning goals of the MQP echo those of the prior projects, including research and communication skills, integrative learning, problem solving, ethical questioning, and other professional capacities. Electrical engineering students may work on telecommunications system design for a local corporation. Students focusing on manufacturing engineering can complete their MQP working in China along with Chinese university students on design projects for multinational firms. Civil and environmental engineering students may work on faculty research projects or with local municipalities. The projects are not structured as internships for pay, but as academic work overseen by WPI faculty.

### **Global Perspective Program**

Many stakeholders have called for development of global awareness and cross-cultural competency in engineering programs. However, few international programs serve a significant number of engineering students. Factors facilitating scalability and sustainability of international engineering programs include progress toward graduation, engineering faculty involvement, and institutional commitment (Vaz 2008).

Through the Global Perspective Program, over 60 percent of all WPI students complete at least one academic project—typically the IQP or MQP—away from the WPI campus, and about 50 percent complete at least one overseas.

WPI operates Project Centers in Africa, the Americas, Asia, Australasia, and Europe, where student teams and faculty advisors spend two months addressing problems for local organizations. Since 1974, over 8,000 students have completed off-campus projects. Off-campus project work is preceded by rigorous preparation, typically involving culture and language learning but focused primarily on research, methods, and skills for the project students will tackle.

The Global Perspective Program has seen high levels of participation primarily because the projects it involves are central to the curriculum. Whereas academic exchange often creates challenges for engineering students to graduate on time, WPI's off-campus programs focus on degree requirements—the IQP and MQP. The objective is neither area studies nor an internship, but faculty-led contextual problem solving. Assessment has indicated consistently higher levels of student achievement in off-campus projects compared to those done on campus (DiBiasio and Mello 2004). Faculty from all disciplines are involved in the program, raising its profile on campus and providing a range of opportunities for students.

### GUIDING PRINCIPLES

With an emphasis on interdisciplinarity, experiential learning, and open-ended problem solving, WPI takes an intentionally broad approach to educating engineers. Evidence suggests this breadth does not come at the cost of successful career preparation. A 2008 analysis of college and university graduates by Forbes magazine placed WPI ninth nationally for earnings of alumni ten to twenty years after graduation (Forbes 2008). WPI's engineering programs have had robust success in accreditation, and were chosen to pilot ABET's innovative EC2000 criteria.

The following guiding principles suggest why the WPI Plan has been sustained and strengthened over the years.

### Coherence and Interconnectedness

The project activities of the plan—the Great Problems Seminar, Humanities and Arts Requirement, IQP, and MQP—form a sequence of steps toward an institutional vision for technological professionals. Each activity emphasizes inquiry, integration, and problem solving in increasingly complex settings. Each is writing-intensive and asks students to develop skills for professional and personal success. Each maps clearly to institutional learning goals.

### Experiential Learning across the Curriculum

Of the four projects, only the MQP is related to the student's major; the other three are specifically intended to broaden students' perspectives. The Humanities and Arts Requirement, IQP, and MQP can all be completed off-campus through the Global Perspective Program. Students solve problems in and out of the major, and in and out of the classroom.

### Engagement across the Disciplines

Faculty from across campus are involved in Great Problems Seminars, IQPs, and the Global Perspective Program, creating a campus culture with high levels of faculty and student collaboration, both in education and research. Engineering faculty participation is visible to students, demonstrating the value they place on project learning in and out of the major.

### A Culture of Evidence and Innovation

WPI has adopted student learning outcomes at the institutional, degree program, project program, and course levels. Broad involvement by faculty in assessment has made the learning outcomes of project work evident, bolstering support and encouraging expansion. Assessment results are used as evidence in a regular process of curricular revision and innovation.

Calls for change in engineering education from higher education leaders, policy

makers, and the private sector have never been so pervasive or compelling. They articulate a need for liberally educated problem solvers and innovators.

Forty years ago, WPI rebuilt its curriculum around experiential learning and broad outcomes; reformers seeking to modify established curricula face a different challenge. Systemic change is not easy, but the stakes are high and the goals are increasingly clear: to graduate engineers with the broad perspectives and skills to creatively and wisely take on the world's most pressing problems. ■

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# The Role of Liberal Education in Preparing Tomorrow's Teachers

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**E**ffective problem solving, analytic reasoning, collaborative decision making, intercultural competency, perspective taking, civic responsibility, and creative leadership—these are just a few of the skills that reports have identified as being essential for the twenty-first-century workplace.

How does teacher preparation fit into this revolution in undergraduate education? What are the skills twenty-first-century teachers need to effectively impact student learning and to creatively address the great challenges facing children, families, and schools today?

At Duke University we have reframed the ways we go about preparing undergraduates to be P–12 teachers. Recognizing that preprofessional teacher preparation programs must go beyond mastery of a professional knowledge base and narrow training in technical skills, we have endeavored to find ways to build on and integrate the liberal education experience (both curricular and cocurricular) that our undergraduates bring with them to the teacher preparation program.

The pillars of the undergraduate liberal arts experience at Duke are interdisciplinarity, mentored research, global experience, civic engagement, and depth of learning in one's chosen major. Our challenge as teacher educators is to develop a set of courses and cocurricular experiences that add value to this foundation of liberal education.

## THE CONCEPTUAL FRAMEWORK

The Duke Program in Education, housed within Trinity College of Arts and Sciences, is one of the original academic units within Duke University and offers Duke undergraduates an opportunity to combine their liberal arts studies with a rigorous intellectual examination of critical issues related to teaching, learning, and

the schooling process. Nationally accredited and aligned with university curriculum standards and national and state professional teaching standards, the program, unlike many traditional teacher education programs, calls for students to major in an arts and sciences discipline as opposed to earning a degree in education. In addition, students complete an intensive teacher preparation program as well as meet the university's general curriculum requirements, which introduce them to a full range of content disciplines. As such, the program's conceptual framework is grounded in the belief that locating teacher preparation within the context of a liberal education is central to effective teaching and learning.

The first two courses in the pathway to teacher licensure (Foundations of Education and Educational Psychology) are taught as Arts and Sciences gateway courses. Students who are preparing to become teachers sit alongside other liberal arts students who may be preparing to be pediatricians, lawyers, clinical psychologists, museum curators, and investment bankers. We believe that situating our foundational courses within a liberal education framework allows students to learn from the diversity of perspectives that undergraduates who plan to enter non-teaching careers bring to issues of education. In these two gateway courses, this mixture of undergraduates with all types of majors examines the most up-to-date educational research and explores ethical, legal, and policy issues relevant to today's public schools. Field experiences, clinical practice, and course assignments are intentionally designed to highlight the inherent interdisciplinarity of the field and to cultivate and nurture the professional dispositions related to leadership, ethical behavior, fairness, diversity, and critical reflection. The program regularly hosts speakers and practitioners from across the country who share their research, insights, and knowledge with students.

An annual documentary film series is also offered pertaining to issues related to public education, including globalization, social justice, social values and change, creative leadership, and educational reform.

Upon completion of these two foundational gateway courses, students preparing to be teachers begin to focus on professional and pedagogical knowledge and skills. They receive a firm grounding in the major schools of thought; explore school, family, and community contexts pertinent to education; examine the prior experiences of the children they encounter during field experiences and clinical practice; analyze professional literature and take part in undergraduate mentored research; and consistently engage in critical reflection of their practice. The program strives to help candidates solidify their understanding of the connection between pedagogy and the theories of learning and development. The program also provides extended and diverse service-learning experiences in which students immerse themselves in the rich history and culture of the Durham community and learn how to work in a variety of school and community settings and with a number of different constituencies, including parents, administrators, and community members.

The teacher preparation program culminates in the capstone fourteen-week, full-day student teaching internship where critical guided reflection drives all work and interactions. Students are provided with weekly comprehensive feedback following classroom observations by full-time senior faculty members and receive one-on-one support with lesson and unit development. From instruction and practice in developing fair and equitable assessments to discussions of and reflection on the rights and needs of a diverse population of students, Duke students learn how to make critical decisions about

strategies and techniques that support the learning needs of P–12 students. Thus, we are striving to create a teacher preparation experience which engages students in big ideas and cross-disciplinary knowledge so they will emerge not simply as effective classroom teachers, but as teacher-leaders equipped with the advanced skills necessary to make significant contributions to education reform and social change.

At Duke, we are committed to understanding the teacher as LEARNER (Liberal Education, Advocacy, Reflection, Nurture, Engagement, and Respect). These core concepts, developed collaboratively by education faculty members within the framework of the university mission statement and national and state professional teaching standards, shape

*The program strives to help candidates solidify their understanding of the connection between pedagogy and the theories of learning and development.*

our program and our ways of relating with our candidates, school and community partners, one another, and the larger university.

### **TRANSLATING THEORY INTO PRACTICE—A STUDENT'S PERSPECTIVE**

Perhaps the best way to illustrate our conceptual framework is to describe how a student goes about making decisions within the core concepts that shape our program. Below we provide a series of scenarios in which Matt, a double major in statistics and mathematics with a minor in education, demonstrates the notion of teacher as decision maker. Matt is currently completing his capstone student teaching internship experience in a fifth-grade classroom at a local public school.

Matt, like all teachers, is required to play many roles—from knowledge provider, to classroom manager, to school social worker—but, as shown in the vignettes below, the common essential skill that each of these roles shares is that of effective decision making. Teachers are first and foremost decision makers; studies have indicated that teachers make important decisions about every two minutes (Borko 2004; Clark and Peterson 1986; Ormrod 2011). Thus, Matt must ask himself: What instructional strategy is most likely in this particular situation to result in learning? What behavior management techniques will not only address the immediate need for more focused attention, but will, in the long run, foster self-regulation among the students? But on

what basis or foundation does Matt make these decisions? What sources inform his decision-making process? To make effective decisions as a novice teacher, we believe that Matt must rely on his capacity to engage in analytical thinking and critical reflection—a capacity that he has developed through his participation in a teacher preparation program embedded within a liberal education experience. Below, Matt's reflections provide insights about how he uses the core concepts of the LEARNER model to navigate the many complex and critical decisions that he must make during the school day.

#### **Liberal Education**

Our program's positioning within the university's larger commitment to a "superior liberal education" makes us somewhat



unique in our design. The program does not offer an education major, but rather builds on the excellence and depth of content knowledge our candidates acquire through their studies across campus and beyond. It is our conviction that our graduates benefit from this commitment to supporting rigorous study in multiple disciplines, met with the excellence of our intensive teacher preparation programs.

9:23 AM: *We are midway through math, and it is clear to me that the number sense for fractions is just not there. How can I help Connie understand that  $2/5$  is a real number, just like 7 or -4? I think about my own mathematical experiences; from complex analysis to regression analysis to Bayesian modeling, understanding the fluidity and tangibility of numbers was essential. I pause my lesson: "Alright, let's try something a little bit different." I write the fraction  $2/5$  on the chalkboard and set the timer for two minutes, asking the students to write down everything they can about  $2/5$  – vocabulary, addition, narrative statements, and anything else that may come to mind. By the time we're sharing, it's clear I've broken through to Connie. Jacob sharing that " $2/5 - 2/5 = 0$ " reinforces that fractions are part of equations just as much as Martin sharing that " $2$  is a numerator" reinforces the vocabulary. Through this practice, I think I can help my students understand the same fluid aspect of numbers that I came to learn through my liberal education in college.*

### Advocacy

At Duke, we recognize that good teachers are good leaders. We prepare our students to be advocates for children and schools both within the institutions where they will be employed and in the greater community. We model our commitment to cultivating leadership by our own participation in advocating for the place of teacher preparation within a Tier

5 research institution as well as our commitment to advocacy for P-12 students and families.

10:08 AM: *I have just introduced the persuasive letter writing assignment, and I feel empowered by my students' commitment to making change. I had shared with them my experiences participating in a service-learning project at Duke. We had recognized that there was a need for a Spanish storytime for kindergarteners at a local elementary school. A partner and I, recognizing the need for students to build literacy skills even in advance of their formal instruction in the English language, planned for and taught this Spanish storytime for a semester to help these students better their reading skills. My students, hearing this story, are inspired to make their own changes in the world to make their personal communities better places. As I listen to their brainstorming, I hear talk about humane treatment of chickens, laws about cleaning up after animals, and safety and accessibility improvements for the school. It's times like these that I am amazed by my implicit power to be a role model for my students.*

### Reflection

Central to our praxis is an ongoing commitment to reflection. Our conceptual framework places "reflective" as the most significant modifier in describing the teachers we educate. Our curricular and cocurricular programs are intentionally designed to cultivate and nurture a level of reflection that goes beyond instructional skill and considers the many factors influencing teaching and learning, including state and national policies and specific cultural contexts of communities and schools.

11:42 AM: *Recess. Sure, the students aren't in the classroom, but that doesn't mean they're not running circles in my mind. Could Sydney's difficulty with the pre-writing have been aided by a modification to her individualized educational*

*plan? I think back—was it two years ago?—to my literacy methods class and recall some visual frameworks that I could give her to help build her plan. Was Miranda's problem with connecting her main ideas something I could help with? I remember my African History professor explaining to me that expository writing of any sort is really just a way to convey a narrative of facts; this sounds like something I could reframe to help Miranda. Before I forget, I need to remember to write about my persuasive introduction lesson in my teacher journal; looking forward to the years ahead in my teaching career, I think this will continue to be an effective, adaptable lesson for many classes to come.*

### Nurture

Held in constant tension with the challenge of high standards for academic excellence that we expect of our undergraduate students and in turn encourage them to expect of their students, we seek to maintain a culture of fairness and compassion. Recognizing that in our preparation of teachers we are invested in the whole student, we encourage our students to recognize the role of nurturing in their own professional identities.

12:13 PM: *Teddy has been looking sad all day, and now he's sitting alone on the carpet eating his lunch. I know he's upset about his vocabulary quiz score—he clearly failed to prepare—but I can't sit and watch as he suffers from the inked anxiety of the parent signature stamp pressing down upon him. I call him over and as I begin to ask, "Is someth-" he breaks down in wet sobs. "Okay we're going to have a breath-holding contest! Breathe in for 1... 2... 3... now hold!" I make myself red then explode gasping for air as he giggles at my overacted expressions. "Teddy, I know the vocabulary quiz score was not what you were hoping for," I calmly say. I think back to those key profes-*

sors—no, mentors—from my time at Duke who saw me struggle under the weight of the standards but were committed to seeing me succeed. “Let’s come up with a plan for how we’re going to prepare for the next one so that your score only gets better!”

### Engagement

Duke has made a commitment to civic engagement a priority, and our programs have been leaders in that effort. We are international leaders in the development of service-learning pedagogies in teacher preparation. Beyond the scope of traditional fieldwork, our emphasis on engagement reconceptualizes the partnership between pre-service teachers, schools, and the university by drawing attention to broader social and ethical considerations of the schooling experience. Our graduates are unequivocally clear that their commitment to teaching is a commitment to a life of civic engagement.

1:35 PM: *When project work time rolled around, I knew the kids were already fired up by their causes as I could hear the discussion carrying through lunchtime. Now, almost an hour into the planning phase of their service-learning projects, I am sensing a parallel between my social life at Duke and my practice here in the elementary school. Every week of the semester, I have been taking a different Pledge Brother of my fraternity to a restaurant or shop or exhibit in Durham; I wanted to share the love I found for this city with these soon-to-be Brothers of mine who may never choose to venture outside of the Duke bubble on their own. Now, floating around the classroom, I am sharing Durham’s resources and stores and restaurants with my students so they might find community members in Durham who could be targets or supporters of their causes. The sparkle of respect for Durham that glimmers in my eyes has been sparked in the eyes of my Pledge Brothers and my students.*

### Respect

We emphasize a culture of respect as we mentor and engage emerging professionals in work with diverse populations. By actively and critically examining questions of power and privilege, we prepare our candidates to meet their students where their students are, and to recognize all that those students bring with them to the learning community.

2:24 PM: *Today’s Afternoon Meeting started about a quarter of an hour ago, where Dennis taught the Amharic salutation “tah-dee-yas”; he had looked up this greeting earlier in the day and shared that it was from a language of Ethiopia. Ruby then shared her current events article about Saudi Arabian women earning the right to vote. “Wait a second,” Dorothy interjected. “Does this mean they couldn’t vote before?” After students share background on civil rights internationally and historically in America, I challenge the students. “Raise your hands: who would get to vote if I said only those with blue eyes can vote?” The students look around wide-eyed. “Who would get to vote if I said only those who are Protestant Christians can vote?” A Jewish student’s hand suddenly drops as quickly as her face, a frown drooping across it. “Don’t worry, Kendra,” Martin reassures her, “even if it were that way, I would make sure your voice gets heard.” Dorothy interjected again: “I just think every person should get to vote.” I’m so glad that my students not only care about each other, but understand the positive externalities of tolerance.*

### FINAL THOUGHTS

There is not an algorithm or formula that teachers can rely on to provide answers for every problem that arises in the classroom. We could not possibly provide enough training and practice to prepare undergraduates for every situation. Instead, our goal is to shape future teacher-leaders through rigorous liberal studies in multiple disciplines within a teacher preparation

framework that promotes and sustains engaged citizenship and service, critical reflection and decision making, advocacy for students and families, and commitment to a culture of fairness and compassion. In so doing, we believe that Matt and his peers will enter twenty-first-century classrooms with a toolbox full of strategies for making the best decisions for helping children and themselves become lifelong learners.

3:05 PM: *Sometimes, when we have had a particularly trying few hours, the kids and I will end the day with a Whitman-esque “barbaric yawp”; standing on our chairs we yell personal declarations for the world to hear. As I come to the end of the teacher preparation program, there are many barbaric yawps I could shout.*

*I’ve been training across liberal arts and possess understanding of several mathematical disciplines; I will use my coursework to inform the way I engage my students.*

*I am a decision maker who will make choices in my classroom based on reflective, critical thinking and researched best practices in education.*

*I am a leader who will unite diverse students with all learning levels.*

*Perhaps most of all, though, I am always a learner, never stopping in my quest to become a better teacher. And with that, the school day has ended. ■*

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# Navigating the Perfect Storm: Nursing and Liberal Education

► **Mary-Ellen Fleeger** and **Thomas W. Connelly, Jr.**, Department of Nursing, Keene State College

Recently, an unusually intense series of storm cells has affected the education of nurses and the practice of nursing. In 2005, the American Organization of Nurse Executives (AONE) released a statement calling for all registered nurses to be prepared at the baccalaureate level in an effort to educate nurses at a level commensurate with their challenging and complex clinical roles. The goal of this initiative within the nursing profession was to create a more educated workforce in the interest of improving patient safety and enhanced nursing care. Similarly, the National Advisory Council on Nurse Education and Practice (NACNEP) affirmed that a nurse's role is to manage care on a continuum, to work as peer on interdisciplinary teams, and to integrate clinical expertise with knowledge of community resources. The increased complexity of the scope of practice for registered nurses requires constant adaptation to change. Adaptation requires critical thinking and problem-solving skills, a solid knowledge foundation in a broad range of the arts and sciences, and the ability to analyze and communicate data. Among the three types of programs that prepare a student to become a registered nurse (i.e., high school diploma, associate's degree, and baccalaureate), the baccalaureate education, with its broader liberal education focus, provides a strong foundation necessary for meeting changing, complex health care needs.

By 2007, the Council on Physician and Nurse Supply released a statement calling for a national effort to substantially expand baccalaureate nursing programs. The statement cited a growing body of research supporting the relationship between the level of nursing education and the quality and safety of patient care. Currently, there is growing consensus in the higher education community that a liberal education should be embedded in all of the professional disciplines.

## THE STORM'S PATH

As the intensity of the storm increased, activities at the local, state, and national levels were underway to develop a responsive navigation system. Realizing the storm's pattern, the Robert Wood Johnson Foundation and the Institute of Medicine (IOM) launched a two-year initiative in 2008 to respond to the need to assess and transform the nursing profession. With more than three million members, the nursing profession is the largest segment of the nation's health care workforce. In navigating patient care, nurses play a vital role in realizing the objectives set forth in the 2010 Affordable Care Act. This legislation represents the broadest health care overhaul since the 1965 creation of the Medicare and Medicaid programs and one that creates turbulence for the nation's health care system. A number of barriers contribute to the turbulence and prevent nurses from being able to respond effectively to rapidly changing practice settings and an evolving health care system. Recognizing the need to overcome these barriers to ensure nurses are well positioned to captain the change and advance the profession, the IOM appointed a committee charged with making recommendations for an action-oriented course for the future of nursing.

## THE NEED FOR HIGHLY EDUCATED NURSES

The IOM committee's 2010 report, *The Future of Nursing*, indicates that health challenges facing the nation have drifted dramatically in the twenty-first century. The American population is older and increasingly diverse with respect to race, ethnicity, and cultural and economic status. These variables create changes in the direction of the nation's health care needs.

Realities of twenty-first-century health care have moved the nursing education model from a clinical service to a liberal

education base. At the center of these liberal education competencies are leadership, health policy, system improvement, research- and evidence-based practice, and teamwork and collaboration. These competencies serve as the rudder for application in the clinical setting. In addition, nurses are expanding roles to master technological tools and information management systems while collaborating and coordinating care across interdisciplinary teams. To respond to these increasing demands, the IOM calls for nurses to achieve higher levels of education and suggests that they be educated in new ways to safely navigate the health care storm.

The IOM has described four key missives:

- nurses should practice to the full extent of their education and training;
- nurses should achieve higher levels of education and training through an improved education system that promotes seamless academic progression;
- nurses should be full partners, with physicians and other health care professionals, in redesigning health care in the United States; and
- data collection and the information infrastructure should be improved to facilitate workforce planning and policy making.

Today's nursing professionals have the potential to play significant roles in transforming health care delivery into a safer, higher quality, and more cost-effective system (Institute of Medicine 2010). However, a new storm cell is emerging—the concern over health care outcomes, while the changing US and global markets forecast a nursing shortage that is expected to intensify as the demand for more and different nursing services grows. Despite recent annual increases in enrollments in entry-level baccalaureate nursing programs, the existing numbers of programs are not

sufficient to meet the projected demand for nurses.

In an attempt to deter the storm's path, the University System of New Hampshire (USNH) assessed the current situation and anticipated the increased need for baccalaureate-prepared nurses. In the process, New Hampshire was found to have one of the highest ratios of associate's to bachelor's educated nurses in the nation at 8.5:1.5, compared to the national ratio of 3:2. This statistic mobilized stakeholders in the region to plot a new direction for nursing education within the university system.

### THE IMPORTANCE OF A LIBERAL EDUCATION IN NURSING

The Association of American Colleges and Universities (AAC&U 2007) defines a liberal education as one that intentionally fosters, across multiple fields of study, wide-ranging knowledge of science, cultures, and society; high-level intellectual and practical skills; an active commitment to personal and social responsibility; and the demonstrated ability to apply learning to complex problems and challenges.

At Keene State College (KSC), academic programs are solidly based in the liberal arts and sciences ensuring graduates acquire the knowledge, skills, and attitudes to navigate the rapidly changing world. According to President Helen Giles-Gee, "Building upon the liberal arts education offered at Keene State, we were pleased to initiate a BSN [bachelor of science in nursing] program that supports the development of higher order skills, abilities, and knowledge leading to an adaptable nursing workforce to alter the path of the perfect

storm in southwestern New Hampshire. In congruence with the mission of the college, the needs of the state and region are served. By adding a professional nursing degree program, KSC would enhance its ability to meet the health care needs of the community."





In 2007, a new general education program called the Integrative Studies Program (ISP) set sail. The program has three sets of outcomes: intellectual skills, perspectives and interdisciplinary outcomes, and integrative outcomes. Key to the design of the program was its conceptual framework based on AAC&U's *Greater Expectations* Report (2002), in which a set of twenty-first-century outcomes for a liberal education were initially identified. Since then, AAC&U has recognized Keene State College as a Campus Action Network Partner and an exemplar program in LEAP (Liberal Education and America's Promise). Identifying the relevance of general education for the nursing program, Provost Mel Netzhammer says, "The Integrative Studies Program complements the directives of nursing organizations and educators to place baccalaureate nursing education firmly on a liberal education backbone."

*Courses in the humanities, arts and sciences, and interdisciplinary domains serve as the hulls of the education vessel and provide the supporting framework for nursing course progression.*

### THE KSC NURSING PROGRAM DIFFERENCES

The chancellor of the University System of New Hampshire (USNH) charged Mary-Ellen Fleeger with the design and implementation of a baccalaureate nursing program at Keene State College. Creating a new program provided opportunities to meet other goals desired by the system and the college. The USNH Board of Trustees has encouraged the institutions to expand options that promote increased use

of facilities and potentially decrease time to degree for students. The new nursing program was developed to do just that, with the addition of a full-time summer session for students beginning the upper-division sequence of nursing courses.

Further, the nursing courses—theory and clinical—do not begin until the second semester of the junior year, so students can first complete all of the general education courses that lay the groundwork for nursing knowledge and practice. Courses in the humanities, arts and sciences, and interdisciplinary domains serve as the hulls of the education vessel and provide the supporting framework for the nursing course progression. Specific allied course requirements were selected to complement the institution's ISP. According to Melinda Treadwell, dean of the School of Graduate and Professional Studies, "This integrative nursing curriculum

builds upon a community of scholars at Keene State while advancing the art and science of nursing." Treadwell goes on to say that having nursing faculty also teach an ISP course truly integrates professional studies across other disciplines. In addition, collaboration with local health care agencies and academic partners facilitates the preparation of students and provides the Monadnock, NH, region with its future workforce.

Finally, the KSC program is a continuum for nursing education.

The program has an option for currently practicing nurses to complete a baccalaureate degree in a time- and cost-efficient manner while acquiring the knowledge, skills, and attitudes to navigate twenty-first-century health care storms.

### HOW THE NURSE OF THE FUTURE FRAMEWORK EDUCATES NURSES DIFFERENTLY

In 2005, the Massachusetts Department of Higher Education (DHE), with the support of the Massachusetts Legislature, entered into a dialogue with nursing professional associations, industry, and other health care stakeholders, and with public and private higher education institutions, to develop statewide and regional programs to address the storm cells of nursing education and practice. In 2006, a working group was commissioned and composed of deans and faculty representing all segments of nursing education, nursing practice leaders, and clinical nursing staff representing the continuum of care. This group reviewed professional standards, initiatives, and best practices in nursing education to form a foundation for moving the priorities forward. To expedite the process, the group formed two subcommittees: the Massachusetts Nurse of the Future (NOF) Competency Committee, charged with furthering the development of a seamless continuum of nursing education by identifying a core set of nursing competencies; and the Massachusetts Organization of Nurse Executives (MONE) Academic Practice Integration Committee, charged with using the identified competencies as a framework for developing a statewide transition-into-practice model.

In 2008, Massachusetts was one of eighteen states selected to attend the first National Nursing Education

Capacity Summit sponsored by the US Department of Labor, the Robert Wood Johnson Foundation, and the AARP Center to Champion Nursing in America. In 2009, Massachusetts was invited to participate as an exemplar state at the second countrywide Nursing Education Capacity Summit. Massachusetts is recognized nationally for its ongoing strategic partnerships, education redesign, and clinical placement system. In a leadership role, Massachusetts is currently working with other states in the New England region (New Hampshire, Vermont, and Rhode Island) to support them in developing their own statewide models for partnership, education redesign, and clinical placements as they prepare the nurses of the future.

A member of the Academic Practice Integration Committee, Thomas W. Connelly, Jr., now serves as director of nursing at Keene State College. Connelly states, "It is a pleasure to create a nursing program at KSC built upon the NOF framework. This is a wonderful opportunity for the college and the local community to assess the health care needs of our residents and to build partnerships, capitalizing on our current resources and working collaboratively to create pathways for success."

The Nurse of the Future Nursing Core Competencies were completed and made available in August 2010, at [www.mass.edu/currentinit/NiNofCompetencies.asp](http://www.mass.edu/currentinit/NiNofCompetencies.asp). Nursing students at KSC will be educated with the knowledge, skills, and attitudes not only to facilitate their academic and clinical success but to prepare them for a life-long rewarding career in the discipline of nursing.

### END OF PROGRAM OUTCOMES

The KSC bachelor of science in nursing prepares "Nurses for the Future" who

1. Demonstrate accountability for practicing nursing within established moral, legal, ethical, regulatory, and humanistic principles;
2. Demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal quality and value;
3. Use information and technology to communicate, manage knowledge, mitigate error, and support decision making;
4. Identify, evaluate, and use the best current evidence coupled with clinical expertise and consideration of patients' preferences, experiences, and values to make practice decisions;
5. Function effectively within nursing and interdisciplinary teams, fostering open communication, mutual respect, shared decision making, team learning, and development;
6. Minimize risk of harm to patients and providers through both individual performance and system effectiveness;
7. Use data to monitor outcomes and care processes, and design and test changes to continuously improve the quality and safety of health care;
8. Influence the behavior of individuals or groups of individuals within their environment in a way that will facilitate the establishment and acquisition/achievement of shared goals;
9. Deliver holistic nursing care and advocate for health promotion and disease prevention strategies at the individual, family, community, and global levels;
10. Demonstrate effective communication skills with clients that foster mutual respect and shared decision making to enhance patient satisfaction and health outcomes.

### CONCLUSION

USNH is demonstrating will and commitment to face the storm and educate nurses who will be prepared for tumultuous times ahead. In response to the IOM report, USNH, in collaboration with KSC, designed a newly established BSN program to meet the health care needs of the Monadnock region, New Hampshire, and the nation. By addressing the issues of innovation, community resources, liberal education, nursing supply and demand, and the projected health care needs of the nation, the curriculum can ensure graduates demonstrate the Nurse of the Future Core Competencies. These competencies, anchored in the liberal education mission of the college, will prepare the KSC nursing graduate with the knowledge, skills, and attitudes to weather the challenges in health care and to charter the waters of change in the years to come. ■

### ACKNOWLEDGMENTS

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# Integrating Pharmacy and the Health Sciences with a Liberal Education

► **Raylene M. Rospond**, dean, College of Pharmacy and Health Sciences, Drake University

The Association of American Colleges and Universities (AAC&U) has developed a twenty-first-century definition of liberal education that empowers students and prepares them to deal with complexity, diversity, and change. It is important to note that with this new definition, liberal education is not synonymous with an education just in the traditional liberal arts fields. A liberal education appropriate for those in arts, science, and professional fields is focused on the acquisition of knowledge, development of intellectual and practice skills, personal and social responsibility, and integrative and applied learning methods.

According to AAC&U's LEAP initiative, liberal education in the twenty-first century should be focused on intellectual and personal development of *all* students so that they can be successful in a global economy and be part of an informed citizenry. That liberal education is obtained through studies that emphasize the Essential Learning Outcomes *across the entire educational continuum*—from school through college—at progressively higher levels of achievement. In the broadest sense this would imply the necessity to have this occur throughout the continuum of college—including in undergraduate, graduate, and professional education.

Some educators, especially in graduate and professional education, may assume that these goals only apply to an undergraduate education. As the dean of a college with a professional Doctor of Pharmacy program—a two-year undergraduate-level pre-pharmacy program followed by a four-year professional program—I would argue, instead that this philosophy of education is relevant at the graduate and undergraduate levels and across a wide currency of fields. The LEAP vision actually aligns almost uniformly with the Accreditation Council for Pharmaceutical Education's philosophy and emphasis as

stated in the Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree. Guidelines, Version 2.0 (effective February 14, 2011):

The standards and guidelines, taken together, have been refined to ensure the development of students who can contribute to the care of patients and to the profession by practicing *with competence and confidence in collaboration* with other health care providers. The revision has placed greater emphasis on the *desired scientific foundation and practice competencies*, the manner in which programs need to assess students' achievement of the competencies, and *the importance of the development of the student as a professional and lifelong learner*. The standards focus on the development of students' professional knowledge, skills, attitudes, and values, as well as *sound and reasoned judgment* and the highest level of ethical behavior.

New evolutions in health professions education would support the need to incorporate the fundamentals of a liberal education into both undergraduate and professional programs. The Medical College Admission Test® (MCAT) is a standardized, multiple-choice examination required for students interested in pursuing allopathic, osteopathic, podiatric, and veterinary medicine. The MCAT has been revised to give attention to the concepts that tomorrow's doctors will need. The change most relevant to this discussion is the inclusion of a new critical analysis and reasoning skills section. This section reflects that medical schools want *well-rounded applicants* from a variety of backgrounds. Another example of this evolution was pioneered by Michael DeGroote Medical School at McMaster University in Canada. The Michael DeGroote Medical School implemented the multiple mini-interview (MMI) format modeled after the

objective structured clinical examination (OSCE) used for health professional licensing examinations in Canada and other countries. This approach allows for the testing of multiple domains such as oral communication skills, ethical decision making, problem solving, prioritization, and the ability to work in teams. The MMI has been adopted by many health programs including medicine, physical and occupational therapy, medical radiation sciences, physician assistant, and, most recently, pharmacy. This mission also aligns with our university's overall mission.

#### **Drake's mission**

Drake's mission is to provide an exceptional learning environment

that prepares students for meaningful personal lives, professional accomplishments, and responsible global citizenship. The Drake experience is distinguished by collaborative learning among students, faculty, and staff and by the integration of the liberal arts and sciences with professional preparation.

This mission, modified and reinforced during the university's 2008 self-study process, has become central to the institution and its programs. This statement may seem obvious. The mission should be central to the university. However, having a mission and being mission-driven are two very different things. The alignment of the mission of the College of Pharmacy and Health Sciences and that of the university proper is the beginning of the Drake story. Consider the college's mission statement:

The College of Pharmacy and Health Sciences provides an intellectually stimulating learning environment with collaborative learning among students, faculty, and staff. Graduates are liberally educated professionals who

are dedicated to serving their clients, patients, profession, and community. The college emphasizes excellence and leadership in professional education, service, and scholarship.

This alignment provides the foundation that has driven the college to value both the liberal arts but also to value and integrate the concepts of a liberal education into our Doctor of Pharmacy program. The following sections explore how outcomes are realized by Drake Doctor of Pharmacy Students.

#### **KNOWLEDGE OF HUMAN CULTURES AND THE PHYSICAL AND NATURAL WORLD**

All Drake pharmacy students, whether Drake undergraduates or transfer students into the professional program, are required to fulfill "The Drake Curriculum." This requirement—beyond the standard pre-pharmacy prerequisites—supports the value that Drake places on students who are liberally educated and who have "engaged with big questions, both contemporary and enduring" as outlined by the LEAP Vision.

The Drake Curriculum contributes to specific objectives drawn from Drake's commitment to build an exceptional learning environment, including to

- A. Enhance the integration of liberal and professional education, with a strong focus on reflective practice, ethics, and leadership
- B. Focus the Drake Curriculum on the achievement of mission learning outcomes, with a strong focus on interdisciplinarity and engaged citizenship competencies
- C. Create and enhance global and interdisciplinary learning opportunities, including learning opportunities which bridge professional divides, for both undergraduate and graduate students

D. Expand collaborative, experiential, and international learning for students, faculty, and staff

E. Strengthen the integration of academic and cocurricular experiences

Pharmacy students at Drake have the advantage of continuing to build on this foundational educational experience through the ability to major or minor in another discipline area, focus additional study in an area of a concentration, and/or complete dual degree programs. The college's strategic plan has emphasized the need to support and enhance such programs such as dual degree programs (PharmD/MBA, PharmD/MPA, PharmD/JD), the university's leadership and global and comparative public health concentration, and an entrepreneurship minor. The extent to which the 460 Doctor of Pharmacy students at Drake take advantage of these enhanced educational opportunities is as follows:

- sixty students enrolled in the PharmD/MBA
- sixteen students enrolled in the PharmD/MPA
- eighty-five students enrolled in a Diabetes Concentration
- fifteen students enrolled in the Global and Comparative Public Health Concentration (this is the second year of this program)
- one student in the leadership concentration (second year of this program)
- nine students in the entrepreneurship minor (second year of this program)
- four in other university concentrations
- seventy-six completing minors in other disciplines (business, biology, music, psychology, etc.)

#### **INTELLECTUAL AND PRACTICAL SKILLS**

The pharmacy curriculum at Drake University has developed many inno-



ventions that address several of the skills outlined in the LEAP Essential Learning Outcomes. Pharmacy Skills and Applications is a six-semester course series intended to assist students in the professional program in developing their abilities and hands-on skills in eight basic competency areas: professionalism, communications, calculations, clinical reasoning, cultural competence, drug information, distribution systems and processes, and systems management. These skills are then tested in a “real world environment” in the students’

*Students often find that they know the correct answer but have difficulty explaining why it is correct. The team is a valuable resource for practicing the explanation of why.*

introductory pharmacy practice experiences. Students are expected to progress through the series (basic to intermediate to advanced) and develop proficiency in each competency area. In all six courses students are evaluated by various means including written examinations at mid-term and a final practical examination utilizing rubrics in any of the eight competency areas covered in that course. Students must earn at least 70 percent or more in each of the core competencies to pass the final examination. Students are allowed an opportunity to retake the portion in which they received less than 70 percent once.

Pharmacotherapeutics is another course in which the learning pedagogy employed requires the development and utilization of intellectual and practical skills. Team-based learning (TBL) is employed as a method to develop and assess the programmatic outcome of

problem solving and decision making. TBL is an active learning-teaching strategy that assists students in learning primarily how to apply course concepts. Students are given module readings and other background materials to be completed outside of class. Students are expected to come to class prepared and are accountable for that preparation via the Readiness Assurance Test (RAT) and peer evaluations. The RAT includes an individual test and a retaking of the same test as a student team. Student teams are formed at the beginning and maintained

through the entire three-semester course sequence. Following completion of the RAT, the majority of class time involves the use of application exercises (e.g., reviewing patient cases). These application exercises stress the use and application of course concepts. Peer evaluations are conducted periodically during the semester.

Reading assignments, study questions, drug lists, and objectives are provided the week before the RAT for each topic. This study and reading time pre-class has several purposes: review of knowledge learned in other classes but not practiced lately (e.g., pharmacology, pathophysiology, pharmaceuticals), introduction to the treatment of a disease or condition, and learning the application of basic principles of drug therapy for a particular disease or condition. Reading assignments and supplemental resources provide information, and the objectives

have associated study questions to help students identify what is important to know. Drug lists are provided so students will have a means to test their knowledge of drugs that are used to treat a particular disease or condition.

RATs are the assessment of students’ knowledge of background material and basic application skills. The material covered in the RAT is the knowledge that you need to know to be able to go on and practice advanced application in the application exercises. IRAT is the assessment of an individual students’ knowledge. GRAT is the assessment of the team’s knowledge. To encourage learning from one another, teams are advised to discuss WHY the answer is correct and WHY the other options are not the best answer. Students often find that they know the correct answer but have difficulty explaining why it is correct. The team is a valuable resource for practicing the explanation of why.

Application exercises (AE) are intended to build on the knowledge reviewed and learned before and during the RAT. AEs are intended to help students learn advanced application of course material to give them the fundamentals of drug therapy management prior to starting clinical rotations in the fourth year. Class discussion starts within a team as they select the best answer to a question. Class discussion then moves to between teams and the instructor to arrive at the learning point of the exercise. Notice that the end result of the exercise is the “learning point” not the “answer,” because often the best drug therapy answer is “it depends.”

Peer evaluations are intended to reinforce individual accountability and prevent uncomfortable scenarios for students where group work is done by one or two members instead of being shared equally among all team members. Peer evaluations also have the potential

to provide valuable feedback to team members so that they may improve and allow for practice evaluating others as many professionals do in practice.

Both of these pedagogical approaches allow for the development of intellectual and practical skills essential to obtaining a liberal education.

### PERSONAL AND SOCIAL RESPONSIBILITY AND INTEGRATIVE AND APPLIED LEARNING

The experiential education program and cocurricular innovations of the pharmacy program provides significant opportunity for students to be actively involved with diverse communities and encounter real-world challenges. The experiential nature allows students to apply their knowledge, skills, and responsibilities to new settings and complex problems.

Pharmacy students are required to complete 300 hours of introductory pharmacy practice experiences and 1,440 hours of advanced pharmacy practice experiences. These experiences occur in local, regional, national and international locations, provide exposure to diverse individuals, cultures and communities, and span the health care system, including individual and group home visits, free clinics, health service organizations, ambulatory care clinics, community pharmacies, hospitals, long-term care facilities, and a wide variety of administrative support agencies.

Drake's College of Pharmacy and Health Sciences has provided the opportunity for international experiences for pharmacy students since the early 1990s. The available opportunities have expanded and the number of students completing international experiences has increased to the point that approximately 30 percent of each class completes a global health care experience.

The learning objectives of these experiences are assessed utilizing a set of

fifty-one competencies that define skills, abilities, and values that the student must demonstrate in order to progress in the curriculum. An example of such a competency is: "Uses appropriate *communication strategies* along with cultural sensitivity when counseling patients whose culture and language is different than the student." Students are evaluated over the course of the four years with progressive expectations for performance. These competencies are grouped into four major areas:

- **Drug Therapy Problem-Solving:** The student is able to demonstrate problem-solving and decision-making skills necessary to evaluate drug use and monitor individual patients' drug therapy.
- **Communication:** The student can communicate ideas, information, and analysis in order to educate, at an appropriate level, colleagues, other health professionals, students, and patients.
- **Product and Service Management:** The student is able to utilize management theory in planning, organizing, directing, and controlling patient-centered care systems and pharmacy business practice.
- **Professionalism:** The student possesses a desire and motivation for lifelong learning and a personal and professional value system consistent with pharmacy ethical and legal standards.

Each core area in the LEAP personal and social responsibility outcomes is developed through the experiential education program. Students must be personally responsible to develop and demonstrate competencies. These competencies include the demonstration of cultural competence, values, and ethics, and require that students demonstrate current skills, also but continue to develop knowledge, skills,

and attitudes through the application of critical thinking, information literacy, evaluation, and judgment—all life-long learning skills—and, finally, that students are engaged in the community in which they practice.

### CONCLUSION

The distinctive nature of a Drake Doctor of Pharmacy graduate is directly linked to the value placed on our graduates receiving a liberal education. Curricular content and pedagogy are developed and directed to develop both individual and group learning skills. Education value can be obtained through combining the Doctor of Pharmacy program with complementary and sometimes disparate educational offerings, such as a public health concentration or music minor. Cocurricular opportunities to continue to develop a meaningful personal life allow a Drake Doctor of Pharmacy graduate to lead through athletics, the fine arts, university- or college-level governance, or engagement in our local, regional, national, and international communities. A reflective, engaged practitioner is a hallmark of a professionally trained graduate who has been liberally educated—which describes Drake University pharmacy graduates. ■

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# For the Profession and for All: Toward Liberal Education in Public Health

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In September 2009, a group of public health educators and advocates met in Chicago to plan the future of undergraduate education in public health. It was a timely meeting. The nation was debating the healthcare plan advanced by President Barack Obama. The Institute of Medicine of the National Academy of Sciences (IOM) had some years earlier issued a call, making the case that all undergraduates should have access to education in public health. Growing support in the field of public health registered the urgency of that call and the daunting scale of the commitment necessary to achieve it. And there was professional urgency. In the first decade of the twenty-first century, undergraduate public health major and minor programs, in a wide variety of designs, had been springing to life across all types of colleges and universities. It was therefore both timely and significant that the Association of Schools of Public Health (ASPH)—dedicated first to graduate and professional education—stepped forward to lead the September 2009 meeting.

## THE EDUCATED CITIZEN AND PUBLIC HEALTH

By its close, ASPH leaders and partners from the Association of American Colleges and Universities (AAC&U), the Association for Prevention Teaching and Research (APTR), and the Centers for Disease Control and Prevention (CDC) had made a decision that held the potential to make a significant impact on the profession. Here are the extraordinary points: the leading organization for graduate and professional education in the field of public health reached a collaborative interprofessional decision to use the Essential Learning Outcomes (ELOs) of Liberal Education and America's Promise (LEAP) as a framework for the design of learning outcomes in public health for all undergraduates. The choice had been theirs to make. The group might have elected to

develop learning frameworks for the burgeoning new major programs in integrative public health. They did not have to put all undergraduates first. But that is exactly what the group decided to do.

For AAC&U, the hope and intention to bring access to education in public health to all undergraduates was a continuation of work begun in 2006. AAC&U had become involved that year in an initiative called the Educated Citizen and Public Health (ECPH; [http://www.aacu.org/public\\_health/index.cfm](http://www.aacu.org/public_health/index.cfm)). ECPH began as a collaborative effort responding to the IOM call, which was originally published in 2003 in a monograph titled *Who Will Keep the Public Healthy?: Educating Health Professionals for the 21st Century*. While the IOM call pointed to health professionals, it made the case that all undergraduates—all—should have access to education in public health. The ECPH initiative took that call seriously and formed a partnership with the Council of Colleges of Arts and Sciences (CCAS), AAC&U, APTR, ASPH, and others to reach the goal. The Analysis article in the summer 2009 *Peer Review* issue on Liberal Education and Undergraduate Public Health Studies describes much of the early work of ECPH.

As the association representing the accredited graduate schools of the profession, ASPH took a more concerted role when they stepped forward to lead the September 2009 meeting and in that way to articulate a plan for future essential work. It was a historic moment for the profession in that it had been convened by ASPH as an interdisciplinary and inter-professional venture: in the first century of its existence, since 1915, academic public health had been primarily focused on graduate and professional education in public health and across the full array of health professions. But by 2009 it was clear that the future of public health education needed to consider both undergraduate majors and general education.

Exactly how to do that was the big question—the reason for the meeting.

To newcomers, the convergence of LEAP and public health might seem at first glance unusual and unexpected. While many of the attendees had been involved in the initiative for years, never before had any of us seen LEAP used in this way—to define and align Essential Learning Outcomes for all undergraduates within an interdisciplinary and inter-professional framework. And the work was successful. After a collaborative process that took two years following the September 2009 meeting, ASPH announced and published the 1.0 version of the working model: Undergraduate Public Health Learning Outcomes (<http://www.asph.org/document.cfm?page=1085>). This achievement is the first such application of the LEAP ELOs. We believe that the process and the model can point the way for other interdisciplinary and interprofessional leaders dedicated to liberal education and to the LEAP framework of ELOs for all undergraduates.

## PROCESS

As we have mentioned, the selection of the LEAP framework was an option, not a *fait accompli*. After reviewing LEAP, specifically considering how the Essential Learning Outcomes could align with and engage big questions of public health on a local and global scale, the group was inspired. Attendees remarked how beautifully the LEAP ELOs mirror the cross-disciplinary and applied approach of public health. In fact, the group wondered if the prolific growth of public health courses and programs on college campuses was itself a sign, a response indicating how well a public health approach facilitates the adoption of the LEAP ELOs. Setting hubris aside, the group had no trouble seeing that the big questions of public health in the twenty-first century—of human and environ-

mental well-being and thriving, of health and human rights and the responsibilities of an educated citizenry—actually could advance the work of LEAP.

Armed with the IOM call, the Educated Citizen and Public Health effort, and the LEAP framework, the group proceeded to outline the process for developing a set of undergraduate learning outcomes in public health.

Determining that the effort would focus broadly on educating all undergraduates, and that the audience would then necessarily include faculty, students, and administrative leaders in two- and four-year institutions of all types, the group chose to use the LEAP ELOs rather than a more traditional public health professional framework to organize its work. Public health education at the graduate level calls for demonstrated achievement of competencies; frameworks of professional competencies do indeed exist and might in fact have been tailored to undergraduate learning. But that approach appeared too narrowly professional. LEAP provided not only a framework of outcomes but also an inclu-

sive language and diction for learning and pedagogy that could be used to foster inter-professional and interdisciplinary communication. The group chose to develop a set of public health learning outcomes aligned with the first three ELOs—knowledge of human cultures and the physical and natural world, intellectual and practical skills, and personal and social responsibility. Instead of calling these three “essential learning outcomes,” the group called them “domains.”

We agreed to develop sets of learning outcomes within the first three domains of the framework and to come back to the fourth domain—integrative and applied learning—after the first three domains had been populated with public health content, concepts, tools, and values. The first domain was modified for public health: knowledge of human cultures and the physical and natural world as it relates to individual and population health. The second and third domains remained as in the original LEAP framework: *intellectual and practical skills* and *personal and social responsibility*. The full set of public health education domains and outcomes can be





found at <http://www.asph.org/userfiles/learningoutcomes.pdf>.

The learning outcomes within each of these three domains were subsequently developed by three ten-member workgroups. The September 2009 leadership group agreed that it was important to populate each of these workgroups with an equal number of representatives from the liberal arts and sciences and from inter-professional public health and to have co-chairs representing each of these two worlds. Following the September meeting, the leaders sent out a call for nominations and were overwhelmed by the expressions of interest. To accommodate the many people who wished to participate, the leaders created additional resource groups

engaged learning. The fourth domain is also the area in which public health excels because so much of what is accomplished in public health is carried out through integrative and applied approaches. The leadership group developed an initial list of examples within domain four, using learning outcomes from the first three domains and suggesting innovative and dynamic ways to integrate and apply them in both classroom and out-of-classroom settings. Those of us in public health like to say that everything in human experience “is public health.” The potential for integration and application of public health issues and topics across every discipline and field has driven, we are sure, the growth of this twenty-first-century integrative field.

provide opportunities for learning across educational experiences.

We intend that the first three domains and their specific outcomes will be brought to life through the activities of domain four. As published now online, the model offers examples for incorporating or integrating the learning outcomes of each domain into general education or discipline-specific courses, and into cocurricular and experiential learning opportunities. The model suggests varied possibilities for incorporating the learning outcomes. For example, domain 2 [Intellectual and practical skills], learning outcome 6: “communicate health information to a wide range of audiences using all types of media.” But this outcome could be accomplished under domain 4 [Integrative and Applied Learning] by engaging a group of journalism students to develop a multimedia public information campaign promoting influenza vaccines among older adults.

To do this, students would need to understand the influenza virus, why a new vaccine is developed every year, why older adults are particularly susceptible to influenza, how that susceptibility translates into premature mortality and costly hospitalizations, and how these results affect society at large—worldwide. They would also learn how health messaging and social marketing differ from other communication strategies and perhaps have the opportunity to engage local health care and public health professionals as well as those from the local media to complete the project. Similarly, a political science or public policy class could stage a mock town hall meeting in which a variety of stakeholders, including the local hospital, the police department, the school board and the leading employers in the community review the latest health status report prepared by the local health department and consider approaches to improving health outcomes in the community. This

*Through application and integration, highly effective and high-impact learning will be most likely to occur in undergraduate students and by extension, in faculty who embrace and incorporate engaged learning.*

to support each appointed workgroup; all told, over 130 people contributed to the process of developing undergraduate public health learning outcomes.

Developing learning outcomes within the three domains was a challenging and invigorating process. When the leadership group eventually progressed to considering the fourth domain, integrative and applied learning, the level of challenge and excitement grew even greater. It is in application and integration that the work of the first three domains produces informed learning, skill development, and responsible action. Through application and integration, highly effective and high-impact learning will be most likely to occur in undergraduate students and by extension, in faculty who embrace and incorporate

#### **MODEL**

The concepts and skills articulated in the thirty-four learning outcomes are intended for faculty to select and integrate into curricular and cocurricular learning opportunities in ways that make sense for the learning, in context. They are not meant to be prescriptive, and the list is not exhaustive; rather it provides illustrative examples of how public health contributes to quality of life locally and globally and how the science and the art of public health can enhance the achievement of the learning outcomes that are essential to undergraduate education. The beauty of this approach lies in its simplicity and flexibility: the learning outcomes call for neither a particular course nor a specified curriculum, but rather

activity would address domain 3 [Personal and Social Responsibility], learning outcome 1: “identify stakeholders who influence health programs and interventions.” In addition, the learning outcomes can expand beyond the classroom into cocurricular activities and also beyond the students’ local university setting. A learning community of students from a variety of fields, such as the biological, social, behavioral, physical, and natural sciences; business; architecture; urban planning; and engineering, could explore the epidemic of obesity locally and globally, researching the rates of obesity in different countries, its causes and effects, and how different countries approach the epidemic. By studying obesity, students would come to “appreciate the multiple determinants of health,” in domain 2 [Intellectual and Practical Skills], learning outcome 9.

## CONCLUSION

The fundamental guiding inspiration for the September 2009 group was the potential to advance the public’s knowledge of public health and its importance in sustaining vibrant and viable communities locally and globally as the world population passes seven billion and continues its explosive growth. Public health is public both because it addresses the needs of entire populations and because we all own public health: it is what we do collectively to advance our self-interests in our own health. If the public neither acknowledges a public health threat nor accepts the proffered solution, there will be no support. The stories of public health failures are legion and often stem from this absence of community ownership, which in turn is a function of a lack of knowledge of public health. Public health suffers from being part of “government,” having the word “public” in its name, and being largely unfamiliar to the general populace. One need only read the letters to the editor in any local newspaper or monitor the deci-

sions of local city or county commissions to see evidence of this disconnect. The fact that we continue to debate the benefits of immunizations, motorcycle helmets, or fluoridation speaks to this fundamental lack of understanding and trust. Thoughtfully and deliberatively working to build a basic knowledge and an appreciation for public health efforts can only reap benefits for the public health system and ultimately society at large.

The development of the undergraduate public health learning outcomes was an important step for public health education and an historic opportunity for LEAP. By providing a solid foundation on which to build the public health learning outcomes, the LEAP framework helped the field of public health respond to the IOM’s call for every undergraduate to be exposed to education in public health. With the model in hand, faculty and students have the opportunity to work together with each other, with other disciplines and fields, and with public health professionals to integrate and apply the learning outcomes directly into the widest possible array of educational settings. These creative partnerships and ideas need to be gathered into a continuously expanding knowledge base of ways by which the learning outcomes are utilized. We hope you will join us in this work. Suggestions and examples on using the public health learning outcomes are welcome at [learningoutcomes@asph.org](mailto:learningoutcomes@asph.org). ■

## ACKNOWLEDGMENT

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# Business Education and Liberal Learning

► **Julie A. Kliegl**, assistant professor of business administration, Wartburg College

**Kari D. Weaver**, assistant professor of library science and library instruction coordinator, University of South Carolina Aiken

**B**usiness students tend overwhelmingly to be instrumental consumers of education (Colby et al 2011). This means they generally want each facet of their education to create value in terms of future career success. On the other hand, liberal learning takes a broader view that education is aimed at developing the whole person. The focus is on the terminal value of the educated citizen in addition to the instrumental value of career success.

“It has often been the case that some students, seemingly motivated only by utilitarian concerns, simply never consider or abandon the hope of finding meaning and purpose that is truly satisfying. They need initiation into critical thought, in part so that they may reflect upon the careerism to which they have become subject,” writes Sharon Daloz Parks (2000, 164). Given such an environment, how does a liberal approach to education fit and make sense? This dichotomy between what business students want and what educators seek to provide is the challenge of business education at liberal arts colleges.

## USING COMPLEX WRITING ASSIGNMENTS TO DEVELOP LIBERAL LEARNERS

Evidence from the Association of American Colleges and Universities (2011) indicates employers are seeking college graduates with the essential skills of critical and analytical reasoning, ethical decision making, complex problem solving, and oral and written communication. This evidence suggests that liberal learning should be embedded in business education to provide greater breadth. However, Colby, Ehrlich, Sullivan, and Dolle (2011) argue that undergraduate business curricula are primarily effective at teaching applied writing skills needed for memos and reports. How can business educators use more complex forms of writing assignments to develop liberal learners?

As an alternate approach to applied writing, writing for inquiry has been proposed as a viable solution for helping business stu-

dents develop the essential skills needed in the modern economy (Colby et al 2011). “The task of writing as inquiry, therefore, begins with the careful identification of a productive question, proceeds through research and investigation to construct a satisfying answer, formulates claims based on these explorations and constructs arguments to elaborate and support these claims, insights and judgments,” (Colby et al 2011,104). The underlying assumption of this pedagogy is that you can create knowledge through writing.

At a small Midwestern liberal arts college with a large business program, the tensions between the practical focus of students and the desire for liberal learning principles arose in a senior capstone course. This led to the forming of a faculty partnership between the authors—a business professor and a librarian—to more fully address liberal learning in the course through a writing-for-inquiry-based project. The librarian suggested adding reflective journaling about the process of completing the project with the original aim of assessing information literacy, but the unintended outcome was even more valuable. The examination of results from the combined assignment of a capstone analytic paper with a linked reflective journal provides evidence that students were able to fully engage in the writing-for-inquiry process and address multiple facets of liberal learning.

To help students understand the entirety of the writing-for-inquiry process, the project was designed with a series of staged assignments culminating in the production and submission of a final five-thousand-word analytic research paper. At each of the stages, students received feedback on their work. Carol Collier Kuhlthau’s (2004) information search process model examines the student research experience through considerations of the thoughts, feelings, and actions required by a robust research task. The business professor and librarian used Kuhlthau’s model to set expectations with students and to openly discuss the need for intervention in research. These reviews allowed the educators

to determine where classroom interventions were most appropriate and target specific concerns relevant to the student experience.

## METHODOLOGY

To examine the success of the writing for inquiry model, the authors used a longitudinal mixed-method assessment to follow advancements in student performance and engagement as the assignment evolved. Over the course of three semesters, qualitative data were analyzed from student reflections and guided class discussions. In addition, quantitative analysis was done on the student papers by analyzing the average word count of the papers, the number of sources being cited, and the Flesch-Kincaid grade level of the writing. Qualitative data were “deidentified” and coded for key ideas emerging from a close reading of the data over time. The quantitative analysis was done with deidentified final papers using tools in Microsoft Word to establish word count and Flesch-Kincaid grade level.

## RESULTS

Analysis of the qualitative material from student journals provided key insights in the areas of personal feelings throughout the process, motivation, and how they sought assistance. Although originally intended as a means of assessing information literacy, this data became more valuable when analyzed to help uncover student experiences of writing for inquiry and to understand their progress in making meaning out of the assignment. The educators found that incorporating reflection enhanced the depth of the student research experience and closely tied the business capstone to the liberal learning tenets of the institution.

Over half of the students reported in the first reflection that they were overwhelmed, confused, frustrated, or uncertain with the research and writing process. These emotions were at a peak

when the students were trying to develop their topics. “When trying to find a thesis or theme for the paper, I found that I had the tendency to think on the broad spectrum because I wasn’t familiar enough with the different aspects of corporate social responsibility,” said a student who ultimately wrote about corporate philanthropy. Kuhlthau’s (2004) process indicates this level of uncertainty is to be expected at this stage in the process, but framing the discussion in the context of personal thoughts and feelings helps students to make their experience explicit and offers reassurance on the benefits of selecting a personally meaningful topic that would later result in increased motivation and perseverance.

The intense feelings subsided after selecting a topic and getting into the research phase and then rose again as the student entered the drafting phase of the paper. Knowing how students were responding emotionally to the process helped guide class discussions and interventions at key points. “I have felt rather annoyed or frustrated with the amount of information available,” reported a student in the early stages. In a later reflection a student reported, “I believe that I have narrowed my topic enough so that it is not too broad. I feel my research problem is relevant to what I am going to be doing after college. I feel I have been able to make this much progress simply by taking the time and doing the research.”

The reflections also told us that students were gaining familiarity with a broad range of sources appropriate to their research. They began to utilize terminology in the reflections such as keyword selection, source credibility, and the thesaurus feature of a database. Use of such terminology indicated information presented in class was being retained and adopted.

With regard to overall motivation to complete the project, over thirty percent of all student comments discussed excite-

ment or interest in the topic. Improved motivation is one of the benefits of being able to select a question related to their own interests but it is a trade-off for those who really feel overwhelming frustration at the early phase of selecting the topic. Other motivators cited frequently by students include pride in their accomplishment, the deadlines, the grade, and support and encouragement from others. “My motivation comes primarily from my desire to present a finished product that will make a solid contribution to this debate. ... I have a goal of making an immediate difference in the global economy when I graduate and for me this paper is part of that process,” said a student who wrote on the role of the US dollar as a reserve currency. These comments also indicate that students were finding greater meaning in the work than just getting a good grade or getting a better job. The switch from instrumental motivations to deeper levels of usefulness showed up in the analysis of the comments. An example of the shift in motivation was expressed in the following: “In the beginning of the semester, my motivation to work on this paper was simply to get it done. I didn’t really know what the purpose of my paper was going to be and it seemed like just another long assignment that was going to take a lot of my time. But as I move closer to completion, I have started to form a paper that I really want to turn out well. So now my motivation comes from the drive to create a paper I am proud of and I am coming closer to that goal as the due date approaches.”

The analysis of the qualitative data also indicated that writing for inquiry can be used to develop deep personal insight. General comments at the conclusion of the process support the feeling that students are grateful for this opportunity to reconcile differing beliefs and ideas. One student discusses the progression of

her topic from the price of HIV medication in developing countries, to whether pharmaceutical companies have a social responsibility to provide affordable HIV medication, to how pharmaceutical companies can work with local programs to provide affordable HIV medication in a sustainable business model. The progression clearly demonstrated deepening personal understanding of the scientific and moral complexities of the issue. Other comments supported the value the project had in helping students to make more sense out of complex issues, including, “I went in with assumptions that changed over time.”

The importance of seeking outside support was mentioned by over sixty-five percent of students. However, their responses revealed an unusual result regarding where they sought support. In this course, the librarian partner was identified as the most frequently utilized source of assistance. National surveys on information literacy suggest that librarians are typically regarded as less important resources, ranking below professors, friends, and family members (Head and Eisenberg 2010). It is clear that students need librarian support, as a recent study on usage of college libraries indicates fewer than seven in thirty students can conduct a reasonably effective search strategy (Kolowich 2011).

The final papers were quantitatively

analyzed for word count, citation count, and Flesch-Kincaid grade level. The results by semester are reported in figure 1. There were clear increases in length of the papers and in the numbers of sources cited over time. A Flesch-Kincaid grade level analysis was used to evaluate the readability of the text. Based on the grade level of students, the results would be expected to fall above twelfth grade (Bovée et al 2003). These measurements are only proxies for quality (Hovde 2000), but the improvement rates were significant at a seventy percent increase in length and a sixty-two percent increase in cited sources. The Flesch-Kincaid grade levels demonstrated increased complexity in their writing, which was especially notable from students who, historically, had been tasked with purely applied writing assignments. This process brought their capstone paper experience into line with their peers in other academic disciplines at the institution.

### CONCLUSION

Ultimately, when considering student learning, liberal educators aim to provide a holistic experience. Based on the evidence provided by this examination, moving business students from instrumental consumers of education toward liberally educated citizens can be achieved through a carefully designed writing-for-inquiry-based project with a reflective journaling component. The authors have demon-

strated improved student engagement and performance on multiple dimensions. Each semester at the end of the project, students are asked to share their insights into the experience. Though students did not forget the challenges and frustrations that came along the way, they found meaning and value in the work. Perhaps one student captured the overall impact of the project in stating, “Writing this paper now is an excellent way for me to put all my broad knowledge and skills to the test at the end of my liberal arts education and see how my problem-solving skills and thought processing work.” ■

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FIGURE 1. RESULTS BY SEMESTER OF FINAL PAPERS QUANTITATIVELY ANALYZED FOR WORD COUNT, CITATION COUNT, AND FLESCH-KINCAID GRADE LEVEL

SEMESTER	AVERAGE WORD COUNT	AVERAGE SOURCES CITED	FLESCH-KINCAID GRADE LEVEL
Fall 2008	3,216	10.7	10.87
Winter/spring 2009	3,469	12.9	11.18
Fall 2009	4,667	11.3	12.38
Winter/spring 2010	5,192	14.6	12.82
Fall 2010	4,767	17.8	12.62
Winter/spring 2011	5,456	17.3	14.66

# Liberal Education Complements Engineering

► **Ronit Patnaik**, sophomore student, Purdue University

It's commonly believed that engineers dominate Silicon Valley and that there is a correlation between the capacity for innovation and an education in a STEM (science, technology, engineering, or math) field. Both assumptions are grossly false. America's progress has occurred due to collaborations between liberal arts and STEM disciplines. Purdue students should embrace the differences between students in STEM and the liberal arts. The divide between engineering and liberal arts students at Purdue is undeniable. It's not uncommon to overhear engineering students comment that liberal arts students are majoring in unemployment. On the other hand, my friends in the College of Liberal Arts never fail to point out that engineering students are full of themselves.

By stereotyping people due to the perceived difficulty of their majors, many students judge intelligence based on a person's major. In this scenario, at least at Purdue, students in pharmacy, engineering, and other science-related majors would be considered smarter than those in English or other liberal arts majors. That is a very simplistic, fallacious view. The valedictorian from my high school—possibly the smartest guy I know—is studying art history at

Yale. He is by no means an abnormality. America's most prestigious colleges are liberal arts powerhouses. Doctors, lawyers, and other professionals requiring postgraduate studies tend to obtain their bachelor's degrees in liberal arts as well as STEM fields.

I chose engineering because it gives me the opportunity to make an impact on real-world problems using my strong suits: math and science. Non-STEM professionals can have just as profound an impact. STEM professionals are in high demand and do drive the economy, but they don't function alone. The norm of the day is interdisciplinary projects—those involving collaboration among multiple disciplines across science and art.

Research by the National Center for Educational Statistics found that based on income, liberal arts majors catch up with their engineering peers a decade after graduation. This is because skills gained from a liberal education—such as communication and flexibility—over time become more valuable in many careers. At any rate, many students earning liberal arts degrees are planning to attend graduate school. Furthermore, the majors people choose do not determine their future successes. According to a survey of 652 domestic chief execu-

tive officers at 502 technology companies, only 39 percent held degrees in engineering, computer technology, or mathematics.

According to the late Steve Jobs, former CEO of Apple Inc., "It's in Apple's DNA that technology alone is not enough—it's technology married with liberal arts, married with the humanities, that yields us the result that makes our heart sing, and nowhere is that more true than in these post-PC devices." Motivation and a willingness to learn from mistakes makes people successful in their chosen fields. Regardless of their majors, once they master their fields, students can find paths to success.

Liberal arts majors are neither dumber than STEM majors nor poised for lower-paying jobs. Engineering students should appreciate the value brought to Purdue by liberal arts majors, while the latter should give engineering students a break when they are freaking out about problem-ridden semester projects. If we join hands, like Steve Jobs, we can create the next iPod. Or else, this debate will plague us until we graduate. ■

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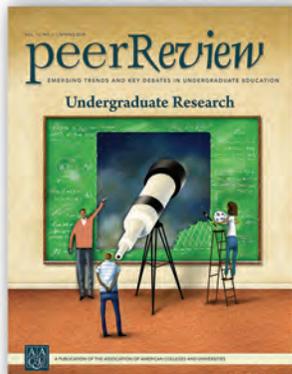
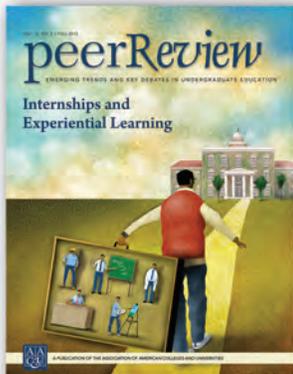
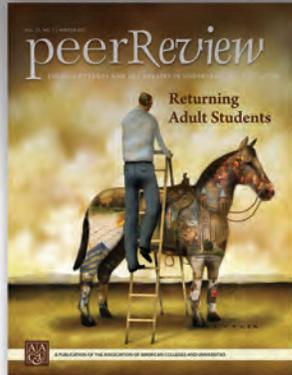
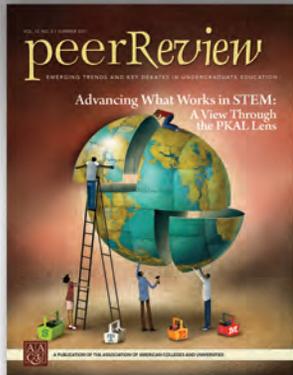
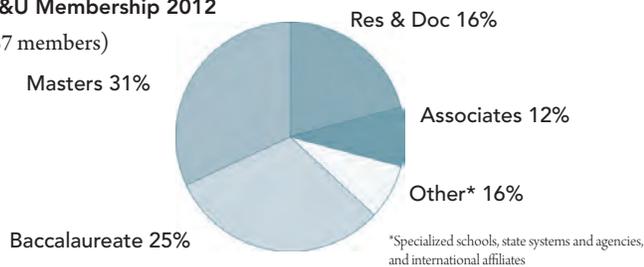
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