Jenny Olin Shanahan, Xiangrong Liu, Jennifer Manak,
Suzanne M. Miller, Jing Tan, Chien Wen Yu,
Bridgewater State University

CUR Focus

Research-Informed Practice, Practice-Informed Research: The Integral Role of Undergraduate Research in Professional Disciplines

Bridgewater State University, the largest of nine state universities in Massachusetts with more than 12,000 students, was founded in 1840 by Horace Mann and is the nation's oldest teacher-preparation institution (formerly a "normal school"). Thus excellence and innovation in education has been our heritage from the very beginning, which may help to explain why Bridgewater State's teacher-preparation programs and other professional disciplines have embraced undergraduate research (UR) as an evidence-based practice. In the context of a tradition of advancing professional opportunities in the Commonwealth of Massachusetts, the UR program at Bridgewater State has successfully employed several strategies for including faculty mentors and students from professional disciplines in the university's range of UR opportunities.

The most important context for our work in UR, and in all university initiatives, is our student body. Two-thirds of our 10,000 undergraduate students are the first in their families to attend college, are students of color, and/or are eligible for Pell grants. According to the Cooperative Institutional Research Program (CIRP) Freshman Survey, they work more hours per week than most American undergraduates, the majority working more than 11 hours per week during the academic year. Forty percent are transfer students, most from two-year colleges in the region. And 60 percent commute to Bridgewater's 272-acre campus of traditional Georgian, red-brick buildings, 28 miles south of Boston. Despite their prevalent challenges, Bridgewater State's students are competing in southeastern Massachusetts with students from some of the most renowned universities in the world for internships, practicum experiences, and, ultimately, graduate or professional school and career opportunities.

Our students' need to distinguish themselves in an intensely competitive environment, coupled with their strong work ethic, have inspired campus-wide support—most notably by the current and former presidents and provosts—for undergraduate research opportunities and funding. Bridgewater State was recently recognized by the Council on Undergraduate Research as one of 57 colleges and universities "leading the way" in supporting student participation at the National Conference on Undergraduate Research (NCUR), to which we send about 50 students every year with full funding from the institution. We fund another 110 students' travel to disciplinary conferences each year. We see the opportunity to present at conferences as key to students' competitiveness; they build their resumes and gain valuable communication skills in presenting their scholarly work. They also network with people in their chosen fields, experience first-hand what others are researching and discussing, and develop confidence and a new concept of themselves as professionals.

Evidence abounds regarding the tremendous benefits to students of conducting faculty-mentored scholarly work (Astin 1997; Brownell and Swaner 2010; Kuh 2008; Lopatto 2003)—benefits that have indeed transformed the future prospects for Bridgewater State students. Especially compelling is the literature showing that the benefits of participating in UR are most significant for students from traditionally under-represented groups (Brownell and Swaner 2010; Gregerman 1999; Locks and Gregerman 2008). First-generation and low-income students do not typically have the networking opportunities that some students with college-educated parents can utilize. Undergraduate research is a prime way for first-generation, low-income, and minority-group students across the country, including at Bridgewater State, to distinguish themselves academically and become sought-after candidates in a competitive environment.

For all of those reasons, UR is an essential part of our university's commitment to social justice, particularly because faculty-mentored scholarly opportunities help "level the playing field" for first-generation, low-income, and minority-group students. UR is infused across the curriculum and throughout the culture of the campus. We contend that at any college or university, UR programs must be inclusive of all departments and schools, especially those with large numbers of majors, such as professional programs. And in light of employers' needs for college graduates with the very skills that are developed through research, especially proficiency in oral and written communication and in solving complex problems (Fischer 2013; "Role of Higher Education" 2012), we see UR as an integral component of professional programs.

Because of the faculty workload required to mentor meaningful research experiences for students, it is important to note that Bridgewater State is a teaching-intensive, primarily undergraduate institution where full-time faculty typically teach four courses each semester. Therefore, while UR at Bridgewater State includes a vibrant, multidisciplinary sum-
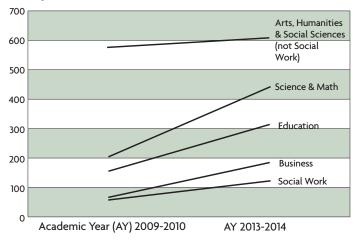
mer program, grants for UR Abroad, and funded travel for all students presenting their research at national and regional conferences, much of our undergraduate research happens, by design, *in the curriculum.*

Research is infused in expected places in the curriculum such as honors theses, directed studies, and research-methods courses, but also in first- and second-year seminars, core and introductory courses, and in major/minor requirements for a broad range of programs. One of our annual campus UR events, the Mid-Year Symposium held each December, features more than 650 "beginning scholar" presentations on 100- and 200-level coursework. More than 600 upper-division students subsequently present higher-level research and creative scholarship every April in our Student Arts and Research Symposium (StARS).
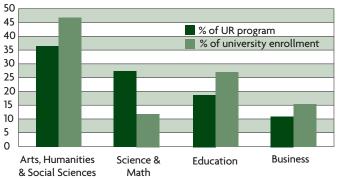
Bridgewater State's Bartlett College of Science and Mathematics and the College of Humanities and Social Sciences offer most of the UR opportunities and are responsible for the majority of the student presentations at the symposia on campus. However, students in the College of Education and Allied Studies, the Ricciardi College of Business, and the School of Social Work are participating in UR at rapidly increasing rates. In fact, the professional disciplines constitute much of the 64-percent growth in UR participation at the university in the past four years—from 1,056 students in 2009-2010 to 1,657 undergraduates in 2013-2014 receiving internal and external UR grants, attaining travel funding to present at national or regional conferences, and/or presenting scholarly work at a campus symposium (see Figure 1). Even these numbers do not account for all of the undergraduate research taking place in our curricula.

Figure 1. Numbers of Bridgewater State University Students Participating in Undergraduate Research 2009-2014, by College/School

While the growth in the number of undergraduate researchers in professional fields is promising, their participation rates do not yet match those of students in the arts and sciences, as Figure 1 shows. For example, students in the Ricciardi College of Business make up 15 percent of the students enrolled at Bridgewater State, whereas they represent only 10 percent of the undergraduate researchers. Students in the Bartlett College of Science and Mathematics, meanwhile, are "overrepresented" in undergraduate research (see Figure 2).

Figure 2. Bridgewater State University Student Representation in Undergraduate Research in AY 2013-2014 by College

The primary reasons that students majoring in business, education, and other professional disciplines are underrepresented in our own and many other UR programs are the lack of appropriate models of UR that fit those disciplines and lingering understandings about "research" that inadvertently leave out what scholars in professional programs do (Shanahan 2013). To overcome those barriers to participation in UR, we have employed the following strategies for building pre-professional research opportunities.

1. *Inclusive Language about Scholarship.* UR materials (e.g., grant applications and calls for abstracts) now include terminology that scholars in professional fields use. Asking management majors to articulate the "project goal" as an alternative to the "research question" makes sense when they are writing business case studies or developing supply-chain strategies. Likewise, in accord with scholarly expectations in education, student-teachers who are developing research-based lesson plans and reflecting on their implementation are invited to share curricular components and self-reflection in their UR grant reports.

2. *Inclusive Modes of Presenting Scholarship.* Campus symposia presenting student scholarship are now structured to include presentation formats used in professional schools. Symposium presenters and audiences alike ap-

preciate the inclusion of *demonstrations* of evidence-based (i.e., researched) practice, such as marketing-plan competitions, in which teams of students each have twelve minutes to put forth strategies for innovative marketing of a local business. Students in allied-health programs can present in an analogous way, with each member of a team playing a designated professional role and sharing the team's therapeutic recommendations about a real or fictionalized case. Audience members often play the roles of clients or other stakeholders in the professional-style presentations, sometimes voting on or completing a brief evaluation of the students' proposed interventions. Such interaction between student-practitioners and community members is a real-world model of how scholarship functions in professional disciplines.

3. *Faculty Development Regarding Disciplinarily Appropriate UR Models.* Strong UR programs rely first and foremost on effective mentoring. Yet professional development of faculty mentors is too often (a) based on practices that work in laboratory settings and follow scientific methods, (b) overly general or obvious (e.g., reminding mentors to be accessible to their research students), or (c) missing altogether. We have seen tremendous benefits, on the other hand, from tailoring development of mentors to particular programs. Colleagues within a program, school, or college share and receive meaningful, disciplinarily appropriate models of what student research looks like in their field, and they brainstorm new frontiers with those who know the discipline. For example, in October 2014, the Ricciardi College of Business hosted Gina Vega, author of *The Case Writing Workbook* (2013), for two days of faculty workshops on teaching research-based case-writing. Faculty members in the School of Social Work have built a scaffolded, research-rich curriculum by working together on research assignments that simultaneously meet disciplinary accreditation standards. They have developed common research goals for their foundational courses that are aimed at preparing students for advanced projects and evidence-based practice later in their undergraduate careers.

4. *Professional Development for Students Concerning Research-Informed Practice.* One of the crucial outcomes of disciplinary relevant faculty development in UR is a shared understanding of the place of student research in the field, which students then learn both explicitly and implicitly. For example, faculty in our College of Education and Allied Studies hear from colleagues at their annual development day about the research their students have conducted in the past year. Student poster presentations are even part of the schedule for campus visits of reviewers for the National Council for Accreditation of Teacher Education (NCATE), demonstrating to faculty and students alike the centrality of research to the profession of teaching. Education faculty and students at Bridgewater State have thereby developed common ways of talking about evidence-based practice. In myriad ways they embody the principle that research and practice must inform each other—in students' internships, service learning, field work, and practicum experiences, as well as in faculty careers.

Undergraduate Research in Education

When pre-service teachers engage in undergraduate research, they refine their teaching skills, develop an appreciation for the role of research, broaden their knowledge of their discipline, and enhance their understanding of the connections between theory and practice (Lassonde 2008; Levy, Thomas, Drago, and Rex 2013; Manak and Young 2014; Slobodzian and Pancsofar 2014). Because UR provides pre-service teachers with the skills they need to become thoughtful, purposeful, professional educators, several faculty members in the Department of Elementary Education and Special Education at Bridgewater State have intentionally woven research assignments into 200-level introductory courses, as well as into upper-division methodology courses.

In introductory education courses, students are exposed to foundational research skills such as conducting a review of literature on a topic, engaging in participant observations, taking field notes, and presenting their research on campus and, in some cases, at the National Conference on Undergraduate Research (NCUR). In the introductory special-education course, students decide on an area of interest in the field, conduct research on the topic, and present their findings at a campus symposium. Students who are interested in exploring their topics further can arrange to conduct observation hours with a specific special-needs population or with an individual with a special need, often bringing together their research and community-service work.

A student in the 200-level Introduction to Special Education, for example, conducted research on a congenital disorder of glycosylation (CDG), a rare genetic disorder in which she first became interested because of her volunteer work with a seven-year-old child with the disorder. She acquired the necessary permissions and training to study the child's communication skills over several months using an augmentative communication device, the Talkables IV. She was able to purchase the $200 device with a university UR semester grant. That student's initial foray into research resulted in an NCUR presentation and an article published in *the Proceedings of the National Conferences of Undergraduate Research.* She went on to conduct research for an honors thesis and summer UR grant that ultimately landed her at CUR's Posters on the Hill event in Washington, D.C.

In the Introduction to Elementary Education course, also at the 200-level, students engage in undergraduate research as they conduct their classroom observations. Students are required to observe three different grade levels at a public elementary school for a total of 40 hours over a semester. Some education faculty members at Bridgewater State have transformed that observational requirement into an engaging research assignment. Prior to beginning their classroom observations, students decide on focused topics they are interested in studying, such as the use of hand-held technological devices in elementary schools, differentiated and culturally responsive instruction, or middle-school classroom management. They conduct a review of recent research on their chosen topic and then develop research questions informed by the literature review. Their classroom observations are then framed by their research questions. In addition to conducting participant observations in the elementary schools, students interview teachers, parents, and administrators using questions that specifically address their research topics and which their professor has steered through Bridgewater's institutional review board (IRB).

During the Introduction to Elementary Education course, students learn to write an abstract of their research; seek UR grant funding to support their travel to the schools and to provide small incentives for the research participants (such as a book for the classroom library); design a research poster; and present it at the campus symposium. Several apply to make presentations at NCUR. The topics of projects recently accepted for presentation at NCUR include language-immersion programs, gender equality in elementary classrooms, and interactive whiteboards ("SmartBoards").

In many upper-division education courses at Bridgewater State, students engage in scholarly experiences such as conducting case studies on young readers, analyzing mathematics and science lessons conducted in elementary classrooms, and exploring various aspects of culturally inclusive instruction. Such research experiences are often not considered "undergraduate research," mainly because the results are not disseminated. However, the assignments are often closely mentored by faculty, they engage students in original discovery, and they mirror the scholarly practices of the discipline—three of four essential characteristics of undergraduate research (Osborn and Karukstis 2009). But they are often seen as ordinary research assignments with a primary goal of assessing students' knowledge, not as knowledge-discovery to be *shared* in the academic and professional community—the fourth characteristic of UR (Osborn and Karukstis 2009). Considering the transformative benefits of undergraduate research for pre-service teachers, department faculty are now discussing how students' curricular research experiences, which are integral to nearly all upper-division education courses, can be revised and reconsidered as un-

dergraduate research rather than as traditional course assignments that are rarely disseminated beyond the classroom.

In some of the upper-level education courses, faculty are now intentionally incorporating undergraduate-research experiences and have even secured grant funding for their students' projects. For instance, students in the 300-level Science and Social Studies Inquiry for the Young Child course have developed a "STEM Family Night" for the community. They created "STEM stations" with experiments designed to introduce preschool children and their families to science and math activities. The students applied for a university UR grant to purchase supplies for the experiments, and they administered pre-event and post-event questionnaires to assess the families' STEM knowledge and awareness and how they might incorporate STEM activities into their children's lives.

Students majoring in elementary and special education at Bridgewater State frequently engage in independent, faculty-mentored research projects that are funded by summer UR grants and are the bases of honors theses. Such a project, "Exploring the American Revolution from Multiple Perspectives through Critical Literacy Discussions in a Fifth-Grade Classroom," was presented at NCUR and Posters on the Hill in Washington, D.C., and was the first undergraduate-research project ever accepted for presentation at the conference of the Massachusetts Reading Association. It was a study of fifth-graders' understanding of the diversity of people involved in the American Revolution after the students had read children's literature written from various perspectives beyond those of British and American revolutionary men, including African Americans, Native Americans, and white women and children. Another student's interdisciplinary honors thesis, "Literature of the First Encounters: Using Self-Immersion in the Scholarly Study of First Encounter Texts to Develop a Fifth-Grade Text Set," similarly sought to broaden elementary-school students' understanding of American history—in this case regarding the "first encounters" between Europeans and Native Americans.

Special-education majors have conducted summer research on young adults' transitions from special-education support in high school to the less-supportive environments of jobs and other adult responsibilities. One such project, aptly titled "Falling off a Cliff," was presented at an international conference on intellectual and developmental disabilities, as was another student's study of community-based instruction for persons with severe disabilities. Other UR projects in special education have studied teachers' roles in the self-confidence levels of students with dyslexia and the efficacy of "social stories" in easing transitions for young children with autism-spectrum disorders.

We know that framing teacher-preparation scholarly practices as "undergraduate research" is still rare in colleges and schools of education. One measure of UR in the discipline—NCUR presentations by pre-service teachers on K-12 education topics—shows a small rate of participation. Of approximately 4,000 presentations at NCUR 2014, only 50 were in the disciplines of elementary, secondary, or special education. Five of those, or 10 percent, were presented by Bridgewater State students. Only three articles on UR in teacher-education have been published by *CUR Quarterly* in nearly 20 years; one of them is based on the program at Bridgewater State (Manak and Young 2014). The other two are both by education faculty at The College of New Jersey. We hope that this article will inspire faculty and administrators in professional disciplines at other institutions to reframe as "undergraduate research" the scholarly work in which their students participate already, perhaps using one of the strategies outlined in the previous section.

UR in Communication Sciences and Disorders

A critical prerequisite for undergraduate researchers in the field of communication sciences and disorders (CSD) is an understanding of the scientific method as it is encapsulated in basic research design. At Bridgewater, faculty members in the program have embraced undergraduate research as a means of preparing CSD students for graduate study in speech-language pathology and audiology. By scaffolding research education throughout the undergraduate CSD curriculum (200-, 300-, and 400-level coursework), faculty have mentored students in acquiring basic knowledge of research design, which is essential for graduate study. For the past four years faculty have systematically introduced research education in the 200-, 300-, and 400-level courses to introduce students to the discipline's scientific method over time. Students learn research-design principles, methodologies, and disciplinary research skills beginning in lower-division courses that help to demystify research, as well as through upper-level courses that require students to conduct empirical research studies.

In the 200-level Introduction to Communication Sciences and Disorders course, students learn that the information taught in CSD has been derived from anatomical and behavioral-research studies. They learn the differences among peer-reviewed publications, professional conference presentations, opinions of authorities, and web-based information. Concepts of evidence-based practices and various levels of evidence are briefly mentioned, although are not covered in depth.

Building on that foundation, in several 300-level courses CSD students learn the concept of evidence-based practice. Literature-review assignments focus on interventional studies in speech-language pathology; the students' reviews must include assigning levels-of-evidence rankings to each study chosen. Writing assignments focus on interventional studies in speech-language pathology. In the 300-level Phonological and Articulatory Disorders in Children course, for example, students learn to conduct critical analyses and solve problems through the use of clinical cases. Students are assigned to intervention-planning groups, with each group responsible for creating an intervention plan for a simulated client that is developmentally appropriate, measurable, and containing achievable goals and objectives. The assignment requires students to provide a rationale from the research literature for their chosen interventions, thereby integrating theory, research, and clinical application within the area of speech sound disorders.

Likewise, in the 300-level Neurological Bases of Speech and Language course, students conduct research studies in small groups. Each group has weekly responsibilities based in problem-based learning, such as writing case studies in neuroscience; conducting mini literature reviews; developing original research questions related to course topics; designing methods and procedures for acquiring data for analysis (i.e., determining how they would set up a study of a topic of interest and then go about collecting data); writing project proposals; and obtaining and analyzing data. Examples of the groups' questions include: "How do the speech, voice, language, and/or pragmatic characteristics of adults with early and later Parkinson's disease differ during a narrative conversation?" "Is there a difference between word retrieval in spontaneous conversation and responsive naming in an individual with aphasia?" "What are the functional communication abilities post-stroke compared with pre-stroke communication abilities in an individual with aphasia?" (Miller and Ciocci 2014). These activities allow students to explore interdisciplinary connections among neuroscience, neurolinguistics, communication disorders, and cognitive psychology, while also learning research design.

In other upper-division CSD courses, students conduct research studies as a whole class. Students in the Neurological Bases of Speech and Language course conduct a systematic review of the intervention literature on speech and language treatments following gunshot wounds to the brain, synthesize the data, and assign levels of evidence to each study. The topic took on added relevance in 2011 when Rep. Gabby Giffords (D-AZ) had sustained a head injury from a gunshot right before the semester began. Our class followed her progress closely, as her injuries involved a significant speech and language deficit. Students in another upper-division course, Voice Disorders in Children and Adults, planned a "Voice Screening Day" on campus. The students chose the topic and created the research questions, methods, and materials to carry out a campus-wide screening of student and faculty voices. Their findings ultimately were presented at the 2014

American Speech-Language Hearing Association (ASHA) annual convention—and they were the only undergraduates to give an oral presentation. Four students traveled to Florida to present the research on behalf of the class.

The next day when their faculty mentor made a presentation on undergraduate research in Bridgewater State's CSD program, faculty from various universities directed their questions not only to the presenter but also to her students in the audience. Several attendees handed out business cards to the students, encouraging them to apply to graduate school at their institutions and remarking that they rarely encounter CSD graduate-school applicants who have conducted undergraduate research in the field.

Undergraduate research in CSD is not only valued by members of the professional organization (ASHA), but also by the students themselves, whose comments on teaching evaluations speak to the importance of conducting research in the discipline. Students in CSD attest to mastering the material in the courses in which they conduct research, as opposed to, as one student put it, "standard lecture and PowerPoint" courses. Student evaluations of courses since 2011, when the curriculum was revised to scaffold research assignments, convey higher levels of student engagement and excitement (Miller and Ciocci 2014). Representative comments from student evaluations of research-intensive CSD courses convey their enthusiasm for research:

> "I found the research portion of the class extremely beneficial. First, I feel that I mastered the material much better than in other classes. I felt that because it was not your standard lecture and PowerPoint type of learning situation, that I was more engaged and excited to learn. I feel that [in] doing the research I not only mastered the information enough to understand, but I knew it well enough to educate others."

> "Overall, I thought that our research study was very successful. The fact that we were all assigned different tasks to do was great because we were able to come together as a team and put all our different creative ideas together. I learned a lot more about voice disorders than I would have if we were in a regular large class without the privilege of performing the study. The Symposium went wonderfully and I think we did a great job working together to present it."

> "I found the research project to be a great learning experience for several reasons. This was a fantastic opportunity. The knowledge foundation built from the text and in-class learning prepared us to explain our study confidently to participants during the Voice Screening Day. The reading of peer-reviewed scholarly journals in preparation to write the results,

discussion, and conclusion sections of our project broadened my knowledge of current research, and we referenced these articles during our presentation. Presenting our research findings was a great experience: a first for me. I feel that the research and presentation approach to teaching this class ingrained the course information because I had to explain it to the many people who asked questions during the Research Symposium. *There's something to be said about being held accountable for what you say and claim to know to be true*. I, like my classmates, am quite proud of our project." [emphasis added] (Miller and Ciocci 2014)

In addition to course-embedded research, majors in communication sciences and disorders at Bridgewater are afforded opportunities for independent, faculty-mentored, grant-funded research during the university's summer UR program. Recent summer-grant recipients have conducted a diverse range of research studies in CSD, including an empirical study of voice disorders in theater-arts students; a systematic review of intervention studies in childhood apraxia of speech; an intervention study examining working memory in early-elementary school children; an investigation of the speech-fluency development of preschool children who are English-language learners; and a case-study analysis of cognitive and linguistic functioning in an individual with a rare occurrence of atypical language dominance and aphasia. Students have presented their research at NCUR, as well as at campus symposia.

UR in Business Management

Because of the visibility of undergraduate research at Bridgewater State, faculty in the Ricciardi College of Business receive multiple inquiries every semester from business majors interested in pursuing research opportunities. That visibility and the "campus culture" of undergraduate research are undoubtedly key to the growth in UR participation by students in management and marketing at Bridgewater in the past five years. A recent study conducted at Texas A&M University on low rates of participation in UR by business faculty and students concluded that business students held misconceptions about what constitutes "research" and had "difficulty figuring out the benefits they would have received from a UR experience," opting instead for internships and other "more obviously beneficial activities" (Mathis, Ramos, Gonzalez y Gonzalez, and Datta 2014). Meanwhile, if business faculty perceive that their students are not interested in undergraduate research, they may conclude that it is "not worth their time" to recruit student-researchers. As the authors of the study point out, "these two misunderstandings reinforce each other to create a climate in which students do not seek UR experiences outside the classroom and faculty

see no reason to offer them" (Mathis et al. 2014). Business students at Bridgewater State, a smaller institution, may have more occasions to see UR in action and learn about its benefits from peers in other programs. Their pursuit of UR opportunities has inspired faculty in the college to translate student interest into meaningful research projects in business. Management faculty at Bridgewater have done strategic planning to create a research-rich curriculum and are utilizing university resources for mentoring independent student projects through directed studies, the summer UR program, and grant-funded UR opportunities abroad.

Myriad reports in recent years indicate that the most important skills employers are looking for in recent college graduates are problem solving and critical thinking (Fischer 2013; "Problem Solving" 2011; "Role of Higher Education" 2012; Scott 2013; Taylor 2010). Employers want to hire college students and recent graduates who can accurately identify problems, seek alternative approaches, think critically, derive solutions, interpret data to make informed decisions, and communicate their insights to stakeholders. Faculty who are interested in improving students' critical-thinking and problem-solving skills cannot simply rely on assigning the standard cases described in textbooks. Through UR they can provide much more valuable opportunities for students to improve their skills, and therefore their marketability, through hands-on experiences. UR in business emphasizes the application of theory to the practice of management, bridging the gap between the concepts taught in business school and real-world situations (Liu 2014).

UR has become, therefore, an important part of our pedagogy in the business curriculum at Bridgewater State. An upper-division Production Operations Management course, which covers mathematical methods such as linear programming and data envelopment analysis (DEA), can be too abstract for students without the opportunity for real-world applications (Liu 2014). In Spring 2014, students worked in small groups to conduct research on the efficiency of coal-fired power plants in the United States. Each group was responsible for one U.S. state; they learned about the state's regulations and the industry's background there, and they modeled the power plants' efficiency using data from the Environmental Protection Agency (EPA).

Students came to understand the complexity of the problem, the messiness of the available data, and some important uses of mathematical modeling. They also observed the impact of pollution-emissions issues on the production decision-making process. The professor who taught the course has conducted extensive research on coal-fired power-plant efficiency, so she became an expert "consultant" for her students, who in turn helped to inform her ongoing research. In a survey conducted at the end of the semester, students rated the

development of their research skills on a Likert-scale from 1 (strongly disagree) to 5 (strongly agree). Their weighted average on two key statements—"I am better prepared to conduct Operations Management research" and "I have a better appreciation of the challenges of modeling real-world decision problems"—were 3.92/5.00 and 4.15/5.00, respectively, indicating solid agreement (Liu 2014).

In another upper-division course, Supply Chain Management, students not only read business cases published in the textbook, but also *write* cases based on their own research. They investigate the major issues in the business operations of a particular organization and examine potential applications of supply-chain models. In this course, the research design and content are driven by the students' interests and enthusiasm. Students from these and other management courses share their business cases and insights with diverse audiences through high-profile public presentations at the university's undergraduate research symposium.

In addition to participating in whole-class research projects, some Bridgewater State business students also seek out independent research opportunities. Their projects are actual business activities that include community outreach and produce tangible outcomes. In 2013-2014, for example, three students participated in a directed study that examined how Chinese languages and culture are taught in the United States. They conducted a program review of a Chinese-language school, conducted a strengths-weaknesses-opportunities-threats (SWOT) analysis of the business strategy of the Confucius Institutes of New England, and carried out a feasibility study regarding the establishment of a Chinese school in Boston, Massachusetts. The students made multiple site visits to Chinese-language schools in New England, distributed more than 400 questionnaires, conducted numerous in-depth interviews, and reported on their findings at seven different conferences and meetings. One of the students is currently co-authoring a paper with her faculty mentor for an international conference in Shanghai.

Another team of five business students conducted a market analysis for the regional airport in New Bedford, Massachusetts, resulting in a report for airport managers and a co-authored presentation at a transportation-research conference. Another directed-study team project conducted by three business students resulted in a community-development study of the economic impacts of the Panama Canal expansion on U.S. ports in the Northeast, especially the Port of Boston, as well as on the development of a new cruise line from Boston to the Caribbean.

Business students in the honors program at Bridgewater State, who are required to complete a two-semester thesis for departmental honors in management, have developed proj-

ects on timely issues affecting the regional economy. For example, a marketing student is currently researching strategic casino expansion in the Commonwealth of Massachusetts after the legislature's recent approval of three new casino licenses. A Bridgewater State alumnus serving as a commissioner on the Massachusetts Gaming Commission has been an invaluable resource for the student's study, which suggests to us that alumni can be key contacts for undergraduate research, just as they are for internships and career networking. In fact, the student's research has led to numerous valuable contacts and a job prospect at the MGM casino in western Massachusetts.

The highest profile student research in business at our university has been university grant-funded UR-abroad projects in China and India. Conducting research internationally gives students incomparable opportunities to immerse themselves in other cultures—particularly, in the cases of China and India, cultures with which they are likely to do business in the future. A faculty member whose own research is on transportation management in rail, aviation, and ports was awarded the UR Abroad grant to mentor four students in a study of China's high-speed rail. The students met with Chinese professors and student research groups studying the high-speed rail at Beijing Jiaotong Transportation University and with executives of the Jinghu High-Speed Railway. They even experienced the high-speed train for themselves, traveling the 820 miles between Beijing and Shanghai in just five hours. Their experiential research study resulted in a publication in the university's UR journal and a co-authored paper for a transportation-research conference.

Faculty members in management and geography mentored a team of students in an interdisciplinary research study of hydroelectric power and sustainable development in rural India. They conducted interviews with citizens of mountain villages in Himachal Pradesh, government officials in Delhi, hydroelectric developers and project engineers at a variety of job sites, and academic scholars at Indian universities.

Another group of four students traveled with their faculty mentor to China to conduct research on the solar-panel industry. They visited solar-power companies based in Beijing, Shanghai, and Suzhou and toured two of the largest manufacturing facilities in China, Canadian Solar and GCL Solar. Their trip coincided with the Solar Power Generation International conference in Shanghai, the largest conference in the field, where students were able to network with researchers from around the world. In three weeks in China, the students distributed over 600 surveys about solar power to residents, college students, and manufacturers onsite in China. They applied DEA modeling and statistical methods to analyze the data and compile results, which will be presented at an international business conference—a rare opportunity for undergraduate business students.

UR in Social Work

Educating competent professionals who promote the well-being of individuals and communities is the ultimate goal of education in social work. The Council on Social Work Education (CSWE) uses Educational Policy and Accreditation Standards (EPAS) to accredit baccalaureate- and master's–level social work programs. The most recent EPAS (2008) are based on competency; they adopt outcome-performance approaches to curriculum design. In other words, social work curricula are no longer based on content sequences (such as diversity, human behavior, policy, research, practice); students are now expected to achieve "professional competence" by graduation.

Engaging social work students in research is critical to the development of the core competencies, as well as for preparing students to engage in active knowledge-seeking, lifelong learning, and the assessment of changing political climates. Yet student attitudes about engaging in social work research have been shown to be complex; faculty need to assess students' readiness for research at the outset (Secret, Ford, and Rompf 2003). Social work students generally have high anxiety and low confidence about statistics and research, and many struggle with research courses. Some students are interested in social work as a helping profession, often without realizing initially that the discipline employs scientific methods and statistical analyses. According to Moore and Avant (2008, 232), "research courses appear to be the most negatively viewed by, most feared by, and least helpful to social work students." Some of our students try to put off statistics and research-methods courses until later semesters, which can extend their time to graduation. Many express to their academic advisors their negative attitudes about research, either showing disinterest or not believing they can do it. The faculty member who primarily teaches statistics for social work majors begins the semester by asking students to assess their degree of confidence about succeeding in the course, on a scale of 1 ("cool as a cucumber") to 10 ("panic attack"); she reports that the average score is always around 7.

Moore and Avant (2008) recommend that social work students' experiences in research begin early in their undergraduate careers, with an infusion of research in many of their courses, so that their skills in and knowledge of research can develop throughout the curriculum and prepare them for advanced projects in later courses. Traditionally at Bridgewater State, important research concepts and skills had not been introduced or emphasized in social work curricula until students reached upper-division courses such as Data Analysis/ Statistics and Research Methods. More recently, in an attempt to demystify and reduce student fear about social work research, we have developed various UR opportunities in early courses. Utilizing syllabus-development strategies, our social

work curriculum is now infused with research projects utilizing multiple university opportunities available to undergraduate students. We believe that these curricular revisions promote the development of the core competencies, such as "apply critical thinking to inform and communicate professional judgments" (Council on Social Work Education 2010, 4) and "engage in research-informed practice and practice-informed research" (Council on Social Work Education 2010, 5).

In Bridgewater's Introduction to Social Welfare course, students are now required to create and present a research poster at the university's UR symposium on their community-based research experience. For this beginning research presentation, their posters must include specific information regarding the history and mission of the organization in which they conducted their service-learning and research; its financial, political, and community support; its human diversity; and its social location. Students are also coached on conference-presentation etiquette from the very beginning of their social work education.

In the 300-level Social Welfare Policy course, the major assignment has been converted to a policy-analysis paper. Throughout the semester students submit scaffolded sections of a comprehensive policy analysis; by the end of the course, they write the policy-analysis research paper following APA guidelines. In addition to learning how to conduct policy research, students learn the requirements of rigorous academic writing. Instead of taking a quiz asking students to analyze a dataset provided by the instructor, students in the 300-level Data Analysis course are now required to develop a research question of their area of interest, create a survey with three or four variables, collect data, analyze the data, and write a data-analysis report—in other words, to carry out a trial research project in a manageable way.

The major assignment of the 300-level Research Methods course has also been overhauled, shifting from a research proposal to a paper on evidence-based practice. The assigned paper is designed to help students practice a part of the evidence-based practice (EBP) process, which provides a framework for accessing and critiquing research evidence to assist in making informed practice decisions. Students are asked to follow EBP steps for a real-life, social work issue affecting a specific, defined population (e.g., depression in older adults, post-traumatic stress disorder in returning veterans, substance abuse in teenagers).

At the 400-level, students in Macro Social Work write a comprehensive paper on a community intervention that includes an explanation of the magnitude of the social issue, a literature review, theories and interventions, and a community-intervention evaluation. During the semester, students also complete a grant application to support their activities.

Besides engaging students in UR in the curriculum, our fac-

ulty members in social work have mentored student researchers in a variety of independent projects and in collaborative research abroad. Students who joined the bachelor's program after the curriculum revision began in 2010, and therefore have engaged in primary research activities at the introductory level, are much more active than the students before them in pursuing co-curricular UR opportunities, such as honors theses and independent research projects in the summer. Before the curriculum revision, only one social work major had applied for an undergraduate-research summer grant in 10 years (between 1999, when the grants were first offered, and 2009). In the four years since the curriculum revisions began in 2010, five majors have been awarded summer research grants. Recent grant-funded UR projects have studied available resources and potential barriers for LGBT (lesbian, gay, bisexual, transgender) homeless youth in Boston; treatment methods for women military veterans with post-traumatic stress disorder; and the experiences of transgender students in Massachusetts' colleges and universities.

Before 2010, students in social work did not present at campus research symposia; at our 2014 Mid-Year Symposium of Undergraduate Research, more than 100 majors presented posters or talks, mostly on their community-based research and practicum experiences. Two years ago, one major's practicum-based research study, on shelter educational initiatives for school-age children experiencing homelessness, was presented at CUR's Posters on the Hill event in Washington, D.C. The student was invited to meet with then-Senator Scott Brown (R-MA) about the student's findings. Research based on students' practicum experiences can also provide valuable information for the agencies and for the clients they serve. The results of another student's study, titled "Geriatric Competency, Training, and Services: Surveying a Local Aging Access Point," helped the agency to better understand its staff and services, according to the student's practicum supervisor.

Teams of social work majors and their faculty mentors have been awarded university UR Abroad grants to study social-support systems for the elderly and the role of social workers in elder care in China and Belize. Their work highlighted the tremendous need for social supports in a diversity of cultures in which elders have been traditionally cared for by family members. They found that demographic and economic changes are shifting responsibilities for care of parents and grandparents to community members and social-service agencies.

Conclusion

The UR program at Bridgewater State has successfully employed several strategies for including faculty mentors and students from professional disciplines in the university's range of UR opportunities—from summer and semester grant-funded projects, to honors theses, community-based research, UR abroad, and research presentations at national

conferences and campus symposia. The key tactic has been to infuse research into the curriculum, beginning in introductory courses, to build students' familiarity with and skills in research. Their initial forays into research in the discipline are then intentionally advanced in upper-division courses and practicum experiences. With that strong foundation of research in the curriculum, students in professional majors at Bridgewater State are well prepared for more independent research in the summer UR program, honors-thesis work, and UR abroad. They also present in significant numbers at campus UR symposia, NCUR, and professional meetings. ◯

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Jenny Olin Shanahan

Bridgewater State University, jenny.shanahan@bridgew.edu

Jenny Olin Shanahan is director of undergraduate research at Bridgewater State University, where she oversees student research and creative scholarship across the disciplines, two annual campus symposia of several hundred students' scholarly work, and publication of The Undergraduate Review: A Journal of Undergraduate Research and Creative Work. *She previously was associate professor of English and director of the honors program at St. Mary's University of Minnesota. Shanahan has presented more than 30 faculty workshops on the mentoring of student researchers and writing across the disciplines. She has published articles on integrating undergraduate research in the curriculum, scaffolding scholarly skills from lower- to upper-division courses, and managing an undergraduate research program. She is a member of the Executive Board of the Council on Undergraduate Research (CUR) and a CUR Councilor in the*

Undergraduate Research Program Directors Division. Shanahan holds a PhD in literature from Marquette University.

Xiangrong Liu is an assistant professor of management at Bridgewater State University. Her research focus is mathematical modeling with applications in supply-chain management, with her research topics including sustainability issues such as remanufacturing, pollution-emission controls, and renewable energy. She has published two research papers as book chapters and one teaching case in a peer-reviewed journal. Liu actively promotes undergraduate research in the College of Business and implements undergraduate-research pedagogy in the courses she teaches. In 2014 she mentored a grant-funded UR Abroad team of students conducting research on the solar-power industry in China. She has a PhD in business administration from Drexel University, with a concentration in operations management.

Jennifer Manak is an assistant professor in the Department of Elementary and Early Childhood Education at Bridgewater State University. She teaches undergraduate and graduate literacy courses, co-coordinates the university's undergraduate research program, and is a faculty associate in the Office of Institutional Diversity. Manak facilitates CUR workshops on integrating undergraduate research into the curriculum and has presented on undergraduate research in the field of education at two CUR conferences.

Suzanne M. Miller is associate professor of special education and communication disorders at Bridgewater State University. Previously, she was in private practice, providing speech-language pathology services and continuing-education seminars for speech-language pathologists. Miller has lectured extensively on communication and swallowing disorders, specializing in disorders following treatment for head and neck cancer, stroke, and neurological impairments, as well as cognitive-communication disorders within the geriatric population. During a 15-year tenure at Tufts-New England Medical Center (NEMC), including as director of speech-language pathology services, Miller was instrumental in developing speech pathology and swallowing services in the Head & Neck Cancer Center. She was also a member of the Stroke Unit Team, Cleft Palate Team, and the Department of Psychiatry at Tufts-NEMC. She obtained her PhD from Emerson College.

Jing Tan is an assistant professor in the School of Social Work at Bridgewater State University, where she teaches both undergraduate and graduate courses, including Data Analysis/Statistics, Research Methods, and Social Welfare Policy. Her areas of research focus on aging and immigration, racial/ethnic minority elders, and the utilization of health and mental-health services among older populations. Tan has also conducted research on health insurance, minority elders' and older immigrants' use of health services, older drivers' issues, elder care in China, and methodological issues related to research on older adults. She received her PhD in social work from Washington University in St. Louis.

Chien Wen Yu is an assistant professor of marketing and management at Bridgewater State University. A member of the university's Undergraduate Research Advisory Board from 2011 to 2014, Yu has been involved with several undergraduate research activities, including mentoring summer grant-funded research, UR Abroad, honors theses, and semester-grant-funded directed studies. His research interests are in international marketing, transportation, entrepreneurship, and Asian studies. Yu also has extensive work experience in the public sector and private industry. He begean his career with the State of North Carolina Department of Commerce as a senior trade manager for Asia and Latin America. He also worked for Ashland Chemical Company and the Bobcat Corporation. His education includes undergraduate and graduate degrees from Beijing Foreign Studies University, Davidson College, Wake Forest University, and Tarlac State University.

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