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Are College Graduates Ready for the 21st Century? Community-Engaged Research Can Help

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Abstract

Research is clear: Employers want college graduates who can communicate clearly, think analytically, and interact respectfully. Targeted educational experiences have measurably improved these capacities. To better prepare undergraduates, the University of Massachusetts Amherst developed the Community-Engaged Research Program, a pilot program featuring a cornerstone course. The course seeks to realize the goal of making research-based learning a standard in U.S. undergraduate education. Data from process evaluations, student assessments, and end-of-semester surveys show meaningful gains in students' ability to think through the research process, communicate research findings, and respectfully address others' needs. Recommendations for building a sustainable undergraduate research model are provided. With further institutional support, such courses could improve college graduate preparedness for the workforce.

Keywords: community-engaged research, undergraduate, research, honors students

"Research should not be done for the sake of research, but for the sake of those whom it can benefit."—Student at UMass Amherst

Introduction

Although often considered among the best of their kind in the world, U.S. research universities have faced pointed bipartisan critiques of their graduates since the late 20th century. Faculty and employers alike bemoan graduating seniors who can't think clearly, figure out problems, communicate with people who are different from them, or respond compassionately to others' needs.

National standard-bearers of undergraduate excellence have been studying these failures of research universities for over 30 years. In 1983, the National Commission on Excellence in Education published *A Nation at Risk: An Open Letter to the American People (NCEE, 1983)*. In this publication, contributors

from the private sector, academe, and government shared a concern that college graduates were not prepared for the 21st century workforce *(pp. 1–3)*. Similar concerns led the Carnegie Foundation for the Advancement of Teaching to create the Boyer Commission on Educating Undergraduates in the Research University. The Boyer Commission's report *(1998)* was published to address the fact that "all too often [undergraduates in research universities] graduate without knowing how to think logically, write clearly, or speak coherently" and that "[t]he university has given them too little that will be of real value beyond a credential that will help them get their first jobs" *(p. 6)*.

Both reports prioritize undergraduate research among the top three postsecondary needs in the United States; both call for increases in undergraduate research opportunities. However, neither has been implemented consistently to the satisfaction of its proponents. Today's employers still find graduating seniors underprepared in fundamental skills.

Virtually echoing the introduction to the Boyer Commission report, over 75% of employers surveyed by the Association of American Colleges and Universities (AAC&U) and Hart Research Associates *(2013)* indicated their desire for colleges to place more emphasis on communication and analytical skills. In this study, fewer than 30% of respondents felt that recent graduates had grasped these skills sufficiently to apply them to real-world problems (whereas 66% of the students surveyed thought that their critical thinking was adequate).

Studies motivated by these concerns show that undergraduate research and active and collaborative learning top the list of high-impact practices producing these outcomes. The AAC&U has recommended 10 undergraduate experiences that have the highest impact on undergraduate learning *(Kuh, 2008)*. The desired outcomes have been described as "knowledge of human cultures and the physical and natural world, intellectual and practical skills, personal and social responsibility, and integrative learning" *(Kilgo, Sheets, & Pascarella, 2015, p. 509)*. A longitudinal study of 4,193 undergraduates from 17 institutions, including private liberal arts schools and public research universities, measured the actual effects of these recommended practices *(Wabash College Center of Inquiry in Liberal Arts, 2012)*. More than internships, study abroad, or other recommended experiences, undergraduate research and active and collaborative learning provided "unique, positive effects on critical thinking, need for cognition, and . . . intercultural effectiveness" *(Kilgo et al., 2015, p. 516)*. Furthermore, undergraduate research cor-

related uniquely with 4-year gains in "positive attitudes toward literacy," and active and collaborative learning significantly increased socially responsible leadership *(Kilgo et al., 2015, p. 519)*.

Participating in research opportunities at the undergraduate level is also associated with a number of benefits. These include cognitive and personal growth and skill development; higher satisfaction with students' undergraduate education; and clarification of career plans, including pursuit of a graduate degree. Students involved in research gain hands-on experience, which increases confidence and self-efficacy *(Bauer & Bennett, 2003; Eagan, Hurtado, Chang, & Garcia, 2013; Hunter, Laursen, & Seymour, 2007)*. Participation in undergraduate research is also linked to students' academic success and retention *(Wabash College, 2012)*, as well as persistence, particularly among traditionally underserved students, who are then more likely to pursue research careers *(Finley & McNair 2013; Schultz et al., 2011)*. The Boyer Commission report called attention to this linkage; today, the battle is on to quantify this striking phenomenon *(Taraban & Logue, 2012)*.

The promise of undergraduate research stands to reason. Rather than facing a list of facts to be memorized, students involved with a research project both generate a workable question and devise a strategy for answering it. They can also work as part of a team, cultivating interpersonal skills. By presenting their findings in posters and talks, as well as sometimes interviewing participants for the project, they develop ability and confidence as communicators for divergent audiences. In particular, inclusion in a research project can make underrepresented students feel more like "insiders" in academic culture as they "move away from the periphery to the center of practice as community members" *(Hunter et al., 2007, p. 66)*.

Spanning 30 years and a broad political spectrum, these studies and reports show a recurring demand for college graduates who can communicate clearly, think critically, and interact respectfully with others who may be different from them. Marking a shift from a primary emphasis on science, technology, education, and math (STEM) classes for workforce preparedness seen in the 1980s *(Kenny, 2003)*, studies show that undergraduate research builds these skills *(Nikolova & Williams, 1997)*, with academic–community engagement amplifying that effect. The purpose of this article is to add to the growing body of literature on the benefits of undergraduate research—and in particular community-engaged research (CER)—with data from an innovative pilot program at the University of Massachusetts Amherst (UMass). It also considers why use of this timely educational methodology has not increased

to meet the clear demand, with recommendations for bolstering such programs in the future.

Community-Engaged Research (CER)

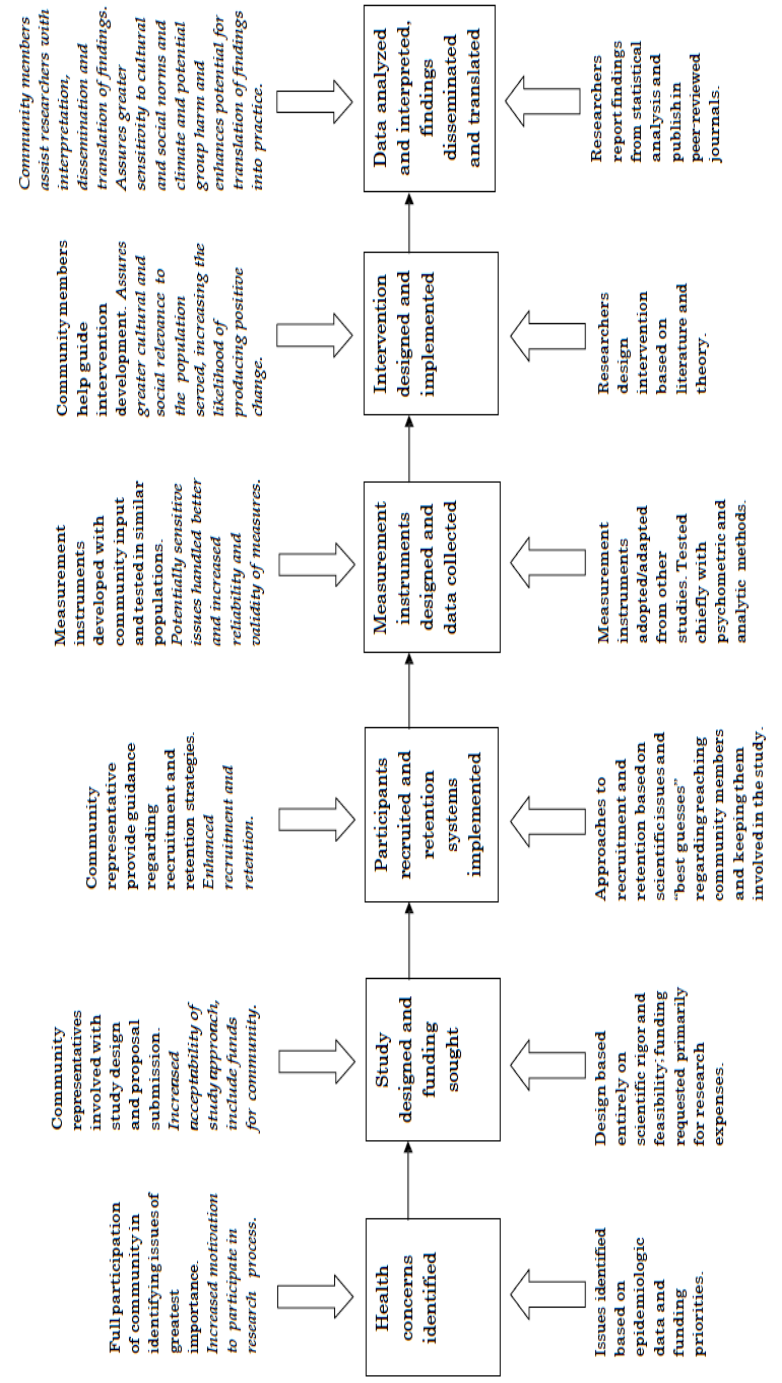
Including communities as part of the research experience adds to the benefits gained by undergraduates. The Carnegie Foundation for the Advancement of Teaching *(2015)* describes community engagement as the "collaboration between institutions of higher education and their larger communities . . . for the mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity" *(para. 1)*. It further asserts that its purpose is to "enhance curriculum, teaching and learning; prepare educated, engaged citizens; strengthen democratic values and civic responsibility; address critical societal issues; and contribute to the public good" *(para. 2)*.

Community-based participatory research (CBPR) is a type of community-engaged research (CER) that is

> a collaborative approach to research [that] equitably involves all partners in the research process and recognizes the unique strengths that each brings. CBPR begins with a research topic of importance to the community with the aim of combining knowledge and action for social change to improve community health and eliminate health disparities. *(Minkler & Wallerstein, 2003, p. 4)*

Critical to this discussion is the research that develops a real partnership between communities and academic partners, with the expectation that cooperation and negotiation will contribute to a committed quest to address local issues. CER approaches thus differ substantively from those of traditional research (see Figure 1). Including nonacademic communities as part of the research experience adds to the benefits gained by undergraduates and enhances the relevance of state-funded land-grant institutions like UMass whose mission is to serve the Commonwealth.

Figure 1. Comparison of CBPR and Traditional Research



From "Community-Based Participatory Research: A Summary of the Evidence," by M. Viswanathan et al., 2004. "Methods," Figure 1.

Community engagement lies on a continuum. The strength of the community–academic relationship can vary greatly. Factors such as type of research questions, type of project and participant groups, community history, and local politics all affect the relationship. Regardless of the individual factors, however, fundamental to all community-engaged research is an understanding that the community will be involved in a meaningful way *(MacQueen et al., 2001)*.

In this article, the term *community-engaged research*, or CER, will be used broadly to describe work between communities and academic researchers. In keeping with Sandmann's *(2008)* scholarship of engagement work, community-engaged research is viewed as distinct from outreach, and connotes bidirectional reciprocity of campus–community partnerships as they affect research and teaching.

A Promising Model at UMass Amherst

In 2012, the Community-Engaged Research Program (CERP) was initiated as a pilot program in the Commonwealth Honors College at the University of Massachusetts Amherst. This program is complementary, yet distinctive, among the university's initiatives because it not only bolsters academic research but also strengthens ties between the campus and neighboring communities. Whereas other research opportunities at UMass offer students lab- or library-based experience, the CERP has focused on the surrounding populace through directed readings, case studies, and field-based work with communities that have asked for topical expertise to solve a problem. With an academic research focus, CERP students supplement community service-learning opportunities that enhance civic engagement but do not involve a specific research question to be answered.

Phase I (development) of the UMass program began in summer 2012 with a part-time director (Carbone) and administrative assistant; an associate director (Ware) was hired in fall 2012. During its implementation (Phase II), the operating budget increased from $2,000 to $10,000; since its inception, almost $85,000 in scholarships has been awarded to 27 students (Table 1). These awards, which matched students with a faculty mentor and community members, funded students' active participation on the research team. Research topics have included exercise programs for the homeless, citizen plant identification, worldwide views on biodi-

versity, literacy development through African heritage–informed education, and farm programs for preschoolers and seniors. Scholarship recipients were encouraged to use this research to inform their senior thesis projects.

Table 1. Course Enrollment and Scholarships

	AY 2012-13	AY 2013-14	AY 2014-15	AY 2015-16	AY 2016-17	TOTAL
Freshman [a]	0	2	6	0	0	
Sophomore	0	9	13	13	6	
Junior	3	11	20	14	8	
Senior	16	32	19	6	6	
Other[b]	0	2	0	0	0	
Totals	19	56	63[c]	33[d]	20[e]	191
Male	4	15	21	7	8	
Female	15	41	37	26	12	
Discrete Student Majors	8	21	24	20	20	
Scholarships						
Number:	12	6	6	2	1	27
Amount:	$56,000	$11,000	$12,000	$3,400	$2,000	$84,400

[a] *Freshman enrollment was allowed spring 2014, fall 2014, and spring 2015.*

[b] *One community member and one non-UMass student participated.*

[c] *Five students registered for a 1-credit colloquium in addition to the class in spring 2015.*

[d] *In fall 2015, administrative changes were made to cap course enrollment at 25.*

[e] *The course was not offered in fall 2016.*

Networking contributed greatly to the success and diversity of the program during its implementation phase. The program has hosted annual gatherings for faculty whose research uses CER methods, as well as their community partners. Invitation and attendance records at these gatherings were used to populate a searchable database of local research opportunities for students. Attendees also publicized the program across campus. Speaking at new student orientations, inviting students to serve as "ambassadors" to talk about the program, and searching the undergraduate course catalog to market the program directly to students enrolled in classes with a "civic engagement" designation significantly increased program visibility.

Central to the program since its inception is a one-credit, module-based class titled "Research Gets Real: Principles and Practices of Community-Engaged Research." In each of its 10 modules, specific and measurable learner-centered objectives frame the assignments (see Table 2). These objectives follow Bloom's taxonomy of educational objectives (specifically the cognitive domain), proceeding from remembering, understanding, and applying concepts to the increasingly higher level critical thinking skills of analysis, evaluation, and creating new knowledge *(Anderson et al., 2001; Bloom, 1956)*. Consequently, action-oriented objectives progress sequentially from foundational knowledge (Modules 1–3) to targeted skill-building activities (Modules 4–10).

Table 2. Learner-Centered Course Objectives and Assignments

Modules and Topics	Learning Objectives By the end of this module, you [learners] will have:	Assignments
1. Welcome and Introduction	a. Completed a baseline needs assessment b. Completed human subjects training c. Read and compared definitions of community-engaged/ community-based participatory research	• Baseline assessment • Human subjects online training • Watch clip of Erin Brokovich video and answer questions related to her role with and for the community
2. Introduction to Community-Engaged Research (CER)	a. Compared the language and definitions of community-engaged research with traditional research b. Examined differences/ similarities between qualitative and quantitative research methods	In 1–2 pages, reflect on the following: (1) What in the readings confirmed or challenged a previously held belief you had? (2) What does qualitative research provide that quantitative does not? (3) What does quantitative research provide that qualitative does not? (4) What is gained by using CER? (5) What, if anything, is lost by using CER?

3. Principles for Conducting Research	a. Critically reviewed a foundational paper in the field of CER b. Demonstrated comprehension of CER by applying information from readings to answer a series of questions about core concepts	Briefly answer the following: (1) How would you describe to a friend the three main points in the foundational paper? (2) What are two challenges a researcher might face when implementing CER? (3) How could this approach to research affect your own major?
4. Writing a Research Question	a. Applied information from readings to create an original research question	Using the readings as your guide, develop (and revise) an original research question.
5. From Research Question to Completed Project	a. Applied guidelines for conducting CBPR to determine the extent to which a given study was carried out according to key principles and practices	For each step in the CBPR process, use the reading to address these questions: (1) Was this step applied in the article you read? (2) If yes, explain how authors applied this step in their research.
6. Researchers as Teachers and Learners	a. Completed an online learning style assessment b. Identified teaching techniques appropriate to different learning styles c. Read and reflected upon a chapter about teaching adults d. Listened and reflected upon a YouTube presentation by Paulo Freire e. Wrote a short reflective paper on this material	• Identify your learning style. • Write a one-page paper describing how you would teach something to a student with a learning style other than your own. Be sure to (1) discuss how you would tailor your teaching to address the other person's style and (2) include at least one point from the chapter or YouTube video to enhance your teaching

7. Challenges of and Strategies for Conducting Research	a. Identified challenges to conducting community research b. Identified and analyzed strategies to conduct research in the face of these challenges	Based on your review of the readings, briefly describe (1) two problems community-based researchers may encounter and (2) two ways to address each problem.
8. How to Write an Abstract	a. Reviewed information on how to write structured abstracts b. Read a sample abstract c. Wrote a 250-word structured abstract d. Compared your abstract in relation to one from a peer-reviewed journal	• Read the materials and one of the selected studies • Write and save your own abstract based on the study you chose • Read the actual abstract written by the authors • Describe how your work compares to the original
9. How to Make a Professional Oral Presentation	a. Viewed a presentation on how to give clear oral presentations b. Critically analyzed a professional oral presentation and a public presentation	• Watch one public and one professional presentation from the list provided. • Compare/contrast the presentations in light of the readings and briefly address the following: (1) What makes a good presentation? (2) What features of a strong presentation come naturally to you/which do you need to work on? (3) How can a professional presentation be as dynamic as a public presentation?

10. How to Present Research Findings through Poster Presentations	a. Reviewed guidelines on how to create an effective poster b. Viewed examples of posters from traditional research and CER projects c. Compared and contrasted different poster formats, designs, etc. d. Completed a follow-up needs assessment and a final course evaluation	In one page, discuss the following: (1) What poster drew your attention/what features made it compelling? (2) What design will you use in your own posters? (3) What distracted from the clarity of a poster? • Follow-up assessment • Final course evaluation

Beginning in spring 2015, five individual colloquia were available to supplement the course. These colloquia meet the higher credit-hour requirement of the research track certificate that was piloted within the Civic Engagement and Service-Learning (CESL) program. The colloquia had five foci: (1) research ethics, (2) research question development, (3) field-based work, (4) enhancement of an existing CER-related course, and (5) conducting an in-depth interview of a faculty member involved in CER.

As noted earlier, CER activities are complementary yet distinctive among existing research units and initiatives at UMass. Supporting units and initiatives include the Office of Undergraduate Research and Studies; Office of National Scholarship Advisement; Integrated Concentration in Science; and the Biology Undergraduate Research Apprenticeship database, as well as discipline-specific internships and cooperative student opportunities. The Office of Research and Engagement, whose mission includes providing leadership and services that support the growth of research and scholarship across campus, helped support the CERP in its first year by funding a National Science Foundation–style summer opportunity known as Research Experience for Undergraduates. Student–faculty mentor teams were invited to apply; eight were selected to work in local communities. The students also attended weekly in-person sessions focused on community-engaged research. The content of these sessions served as the basis for development of the "Research Gets Real" class.

Course Design

In response to student feedback, after being offered both in-person and online-only, the course now utilizes a hybrid delivery approach. Students access, complete, and submit online weekly assignments using Moodle, a learning management system that delivers course content, hosts online learning activities, and tracks student participation. The class also meets in person monthly as a group.

Enlisting this hybrid format, the course combines active-learning pedagogy with targeted content. To determine course content, the authors initially defined the module topics in consultation with an advisory committee of faculty and community members; however, the content has remained responsive to student feedback each year. In this way, the instructor assumes the role of teacher, colearner, and facilitator to assist in the students' learning process.

Key Outcomes

The course content deliberately addresses three key outcomes emerging from the literature and sought by employers: (1) communication capacity, (2) critical thinking skills, and (3) respectfulness.

Communication capacity. The "Research Gets Real" syllabus includes explicit instruction in written, visual, and verbal communication skills. The modules provide opportunities for students to learn by doing.

In Module 6, students identify their personal learning style and reflect on how to communicate research findings to others with different backgrounds and learning style preferences. Increasing awareness of their own and others' learning preferences helps students adapt to different situations and optimizes knowledge acquisition *(Smart, Berry, Kumar, Kumar, & Scott, 2015)*.

In Module 8, students write a 250-word structured abstract of a peer-reviewed journal article. After submitting their abstract, students see the original published version and reflect on how their work compares. Throughout the process, students have access to samples showing how abstracts evolve through the editing process.

In Module 9, students critique oral presentations ranging from TED talks to disciplinary conference talks recorded on YouTube. Students also attend on-campus research conferences to hear presentations by faculty and peers.

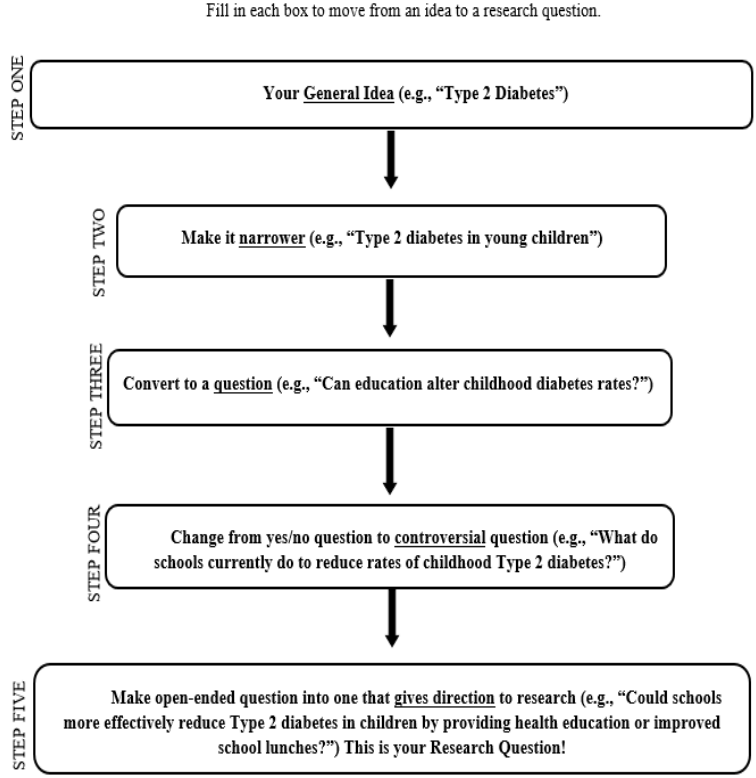
In Module 10, students examine faculty research posters to identify visual and conceptual features that enhance or impede the clarity and effectiveness of presenting research results. As new

critics of clear communication, they "see" anew design elements, including use of color, font, and white space.

Critical thinking skills. We refer to critical thinking as the "intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action" *(Foundation for Critical Thinking, 2013, para. 3)*. Every module develops this skill in some way. Early on, new concepts are introduced following a traditional "read and respond" structure; later modules (4–10) require students to use critical thinking in more creative tasks. For example, after reading about the differences between traditional research and CER—and the methods used in each—students explicitly consider how quantitative and qualitative methods are used together (or separately) to gather data to answer a research question. They have to figure out how strong the data are and what kind of conclusion can be drawn from different types of data. Consequently, students emerge far less likely to use a single anecdote to support a general claim about "all" data.

In Module 4, students formulate a research question, which they revise multiple times with instructor feedback. Questions typically develop from a broad, vague area of interest to a question for which the student can ascertain a valid finding. The assignment required for this module is shown as Figure 2.

Figure 2. Class Assignment.



Note. Adapted from Empire State College (n.d.) and the George Mason University Writing Center (2017).

Students first read concrete, action-oriented works discussing how to write a research question. We chose samples from the George Mason University Writing Center *(2017)* and from an online tutorial by Empire State College *(n.d.)*. From these, students could see what is meant by a question that is too open-ended or broad (e.g., "What forces affect race relations in the United States?"), as well as more directive alternatives (e.g., "What corporate hiring practices affect race relations in Nashville?")

Students then develop a research question of their own, working it through steps of increasing specificity. This product-based assignment is a response to the need for experiential skill development—that is, we know that students have a skill because they demonstrate it. The same student who waxes lyrical about the need for a direct, answerable question may turn around and propose a project to "study Type II diabetes." Vital to learning is the

next step, in which the student is told that "studying Type II diabetes" is itself a vague mission that is not quite a question. When the student recognizes that fact and refines the question to ask, "Do seniors with Type II diabetes living at home neglect their diet more than seniors living in assisted care?" the theory and practice combine to create lasting learning.

For Module 5, students apply guidelines for conducting research to determine the extent to which a given study was carried out according to key principles and practices of CER. In this way, they interpret and analyze the guidelines and evaluate their use. In the second in-person meeting, students share their rationale and thought processes with the group and provide feedback to others about their research questions.

Respectfulness. As a field, CER naturally fosters respectfulness. At times, it makes students recognize their unconscious prejudices. The course design bolsters this attitude.

For instance, as a first assignment, students complete an online human subjects training course. Through this training, they learn not only the history and purpose of research ethics, but also particular research behaviors that convey respect for others.

As part of Module 5, students review guidelines for conducting CBPR specifically in the social sciences. They then apply the guidelines to determine whether a given study is conducted according to CBPR principles. The extent to which researchers show respect for participants is one of the yardsticks by which they make these assessments.

Module 7 explores the challenges that historically have faced those who conduct community research. Students read several articles and view a video, after which they write a one-page paper that (1) identifies two problems community-based researchers may encounter in the field and (2) describes two ways they could address each problem. In writing their response, students are asked to consider challenges from both the researchers' and community members' perspectives. A future addition to the course could include readings about unconscious bias, with each student reflecting on resources that both promote and inhibit respectfulness.

Evaluation

The three data collection methods employed to assess the course reflect all levels of Bloom's cognitive domain: (1) process evaluation, documenting progression of the program's development; (2) author-developed course assessments; and (3) standard-

ized end-of-semester evaluations *(Bloom, 1956)*. These data are collected on an ongoing basis.

During the development of "Research Gets Real" (Phase 1), process evaluation data were collected at the end of each module (see Table 3). Through open-ended questions and group discussions, students were asked to describe what they liked most and least about the content and delivery of each module. Students were also encouraged to provide specific suggestions for change.

Table 3. Sample Process Evaluation Questions

1.	What research skills have you gained and/or improved upon as a result of this unit?
2.	In what ways do you feel you will use these skills for your personal and/or professional growth? Please indicate if you are thinking about/plan to use these skills for your honors thesis.
3.	What did you like most about this unit? Why?
4.	What did you like least about this unit? Why?
5.	For each of the following terms, please provide a brief definition and why you think it is important: • Community • Community-placed research • Community-based participatory research (CBPR) • Qualitative methods • Quantitative methods • Stakeholders • Generalizability
6.	What additional comments, suggestions, or input would you like to share?

At the beginning of each semester, author-developed course assessments ask students to identify their expectations about the class, as well as any concerns. During the last week of class, students answer follow-up questions, such as, "What research skills have you gained and/or improved as a result of this course?" "In what ways do you think you will use these skills for your personal and/or professional growth?" and "What advice would you give to future students taking this course?" (see Table 4).

Table 4. Author-Developed Student Assessments

	Baseline Questions
1.	Name one research skill you hope to gain and/or improve as a result of this course.
2.	What do you feel you need to know about community-engaged research for your personal and/or professional growth?
3.	In what ways do you see yourself using information from this class now or in the future?
4.	Name three terms that the word "community research" call to your mind at this point.
5.	We will be using a variety of teaching strategies in this class. What would you like us to know about how you learn best?
6.	What questions or concerns do you have about this class?
	Follow-Up Questions
1.	What research skills have you gained and/or improved upon as a result of this course?
2.	In what ways do you feel you will use these skills for your personal and/or professional growth? Please indicate if you are thinking about/plan to use this research for your honors thesis.
3.	Name one part or component (it can be a reading, an assignment, or a discussion) of this course that surprised you. Explain briefly, in what ways did it surprise you?
4.	What needs to be changed or added to this course (or any specific module)? What suggestions do you have to make this change or addition?
5.	If any portion/s of this course will affect a future college project or long-term career plans, please describe how.
6.	What advice do you have for a student who takes this course in the future?
7.	Use the space below to provide any other comments you would like to share.

At the end of each semester, we administer standardized, university-based evaluations ("Student Response to Instruction" or SRTI). SRTI questions ask students to rate the course in a series of open-ended questions. Quantitative data regarding opportunities for student participation, effectiveness of instructors' teaching, amount learned, and overall course ratings are also collected and measured on a scale from 1 (lowest) to 5 (highest). These data are compiled by the university and compared to departmental, school/college, and campus mean scores. Comparison means are calculated using combined fall/spring annual year data. A comparison group mean is the grand mean of a set of section means or standard deviations—not the mean or standard deviation of student responses pooled across sections *(University of Massachusetts Amherst Office of Academic Planning & Assessment, 2017)*.

Results and Discussion

Qualitative data from student course assessments and open-ended SRTI evaluations (Table 5) show that students acquired new research-related skills, a finding that mirrors results at peer institutions across the country. At UMass, as elsewhere, undergraduate research experience has been shown to cultivate and sharpen the key skills sought by employers and identified in the reports and studies mentioned earlier: communication capacity and critical thinking *(Eddins, Williams, Bushek, Porter, & Kineke, 1997)*. Furthermore, because it addresses work with communities, the UMass program has increased evidence of student respectfulness.

Table 5. Qualitative Student Course Assessment and SRTI Data

Questions	Themes	Subthemes	COM[a]	CRIT[b]	RESP[c]
What research skills have you gained and/or improved as a result of this course?	Skills and Insight	Research-related skills (writing abstracts/RQs, making posters, oral presentations)	X	X	
		Community-engagement perspective		X	X
		Expanded view of research		X	X
In what ways do you think you will use these skills for your personal and/or professional growth?	Use of Skills	Use of skills—academic (for thesis work, other class assignments)	X	X	
		Use of skills—"real world" application (job interviews, graduate school applications)	X	X	
		Perspective (about research process, oneself, others)		X	X
		Relevance (practical, applicable)	X	X	
What did you like most about the course?	Content	Interesting topics		X	
		Novel approach to research		X	
		New way to view interaction with other individuals and communities			X
	Format	Flexibility with online units, monthly in-person meetings, rapid feedback	X		
What did you like least about the course?	Content	Volume of required readings	X		
	Format	Feeling disconnected from peers, need for self-motivation	X		

Note. [a]COM: Communication skills. [b]CRIT: Critical thinking skills. [c]RESP: Respectfulness.

Table 6 shows mean SRTI data for global items (Questions 10–12), which are the items best suited for informing summative evaluations of teaching performance *(University of Massachusetts*

Amherst Academic Planning & Assessment, 2017). Results of Question 9 regarding the instructor's ability to stimulate student participation are also included because of the importance of modeling learners' active engagement.

Table 6. Standardized End-of-Semester Student Response to Instruction (SRTI) Evaluations: Mean Scores

Semester Year	Comparison Group	Q 9[a] Mean (SD)[e]	Q 10[b] Mean (SD)	Q 11[c] Mean (SD)	Q 12[d] Mean (SD)
Fall 2013	Course	4.6 (0.68)	3.7 (1.02)	4.5 (0.51)	4.0 (0.83)
	Department[f]	4.6 (0.46)	3.9 (0.57)	4.5 (0.46)	4.1 (0.56)
	Campus[g]	4.5 (0.46)	4.1 (0.54)	4.4 (0.49)	4.2 (0.57)
Spring 2014	Course	4.7 (0.70)	3.7 (0.85)	4.4 (0.73)	4.0 (0.74)
	Department	NA[h]	NA	NA	NA
	Campus	4.2 (0.55)	3.9 (0.51)	4.3 (0.52)	3.9 (0.56)
Fall 2015	Course	4.6 (0.67)	3.4 (1.09)	4.4 (0.58)	3.6 (0.87)
	Department	4.7 (0.46)	3.9 (0.85)	4.5 (0.57)	4.1 (0.76)
	Campus	4.6 (0.57)	4.1 (0.78)	4.5 (0.61)	4.2 (0.73)
Spring 2016	Course	4.8 (0.42)	3.4 (1.07)	4.6 (0.50)	3.9 (0.99)
	Department	4.7 (0.46)	3.9 (0.85)	4.5 (0.57)	4.1 (0.76)
	Campus	4.6 (0.57)	4.1 (0.78)	4.5 (0.61)	4.2 (0.73)
Spring 2017	Course	4.6 (0.73)	3.6 (0.62)	4.2 (0.70)	3.6 (0.61)
	Department	4.7 (0.48)	3.8 (0.88)	4.5 (0.62)	4.1 (0.80)
	Campus	4.6 (0.57)	4.1 (0.79)	4.4 (0.61)	4.2 (0.74)
	Course Average	4.7	3.6	4.4	3.8
	Dept. Average	4.7	3.9	4.5	4.1
	Campus Average	4.5	4.1	4.4	4.1

[a]*Question 9. The instructor stimulated student participation (5 = Almost always, 1 = Almost never).*

[b]*Question 10. Overall, how much do you feel you learned in this course? (5 = Much more than most, 1 = Much less than most).*

[c]*Question 11. Overall rating of this instructor's teaching (5 = Almost always effective, 1 = Almost never effective).*

[d]*Question 12. Overall rating of this course (5 = One of the best, 1 = One of the worst).*

[e]*SD = Standard Deviation; average SD shown for Department and Campus data.*

[f]*Department = University courses from the same department within enrollment category.*

[g]*Campus = University courses within enrollment category.*

[h]*NA = Data not available.*

These data indicate that the course stimulated student participation more often than departmental honors or campus averages (Question 9) and was on par with effectiveness of instructor's teaching (Question 11). The course was rated slightly lower than departmental honors and campus averages for amount learned (Question 10) and overall rating (Question 12), which may be

expected because comparison group means are derived from all courses, most of which are intensive three- or four-credit offerings.

Insofar as these metrics demonstrate success for the course, a few practices are undoubtedly responsible. Foremost, we have maintained a high degree of responsiveness to student suggestions. Each semester, we improved the course to address areas of confusion, and innovative student ideas often made their way onto the syllabus. For example, student suggestions informed modifications to assignments and readings for each module, facilitated clarification of homework instructions, and even increased diversity of enrollment (by following students' suggestions to directly market the course in targeted classrooms). The eventual hybrid format met student needs not satisfied by early experiments with fully in-person and online-only formats. Aggressive marketing also increased class size considerably. In addition to targeting classes with a high minority student enrollment to receive an in-class pitch, we appealed to classes in both social sciences and natural sciences, stressing the use of CER in students' overall career development. To that end, we scoured the entire university course catalog each term to find classes in departments outside our networks that contained relevant content or methodology.

Achievement of Key Outcomes

These instruments measured how the class achieved our "local" pedagogical goals of student recruitment and retention from a broad array of fields, efficacy of teaching methods, and student satisfaction. The class further illustrates precisely how undergraduate CER fosters the skills that are paramount in the national conversation. Can a course in CER promote communication capacity, critical thinking, and respectfulness? The results suggest it can.

Communication capacity. When asked in final assessments what components of the class they liked most, students commonly cited enhancement of communication skills. Students reported that these types of skills were expected, but not explicitly taught, in their other coursework. One student talked about communicating ideas through a visual medium in this way: "No other class . . . has given me a lesson on [how to create] research posters. I have previously learned about public speaking and PowerPoint presentations, but I have never been taught how to even approach creating a poster."

Another student described newfound awareness of diverse cognitive patterns in audiences:

> Understanding that people learn things in different ways will help me shape how I present information. I facilitate a class this semester and this really helped me change my teaching technique in order to help everyone understand the information better.

In addition to learning about how to communicate with others, students discovered new things about themselves, as this student noted:

> Not only did I learn about challenges, solutions to those challenges, and what makes a visual and oral presentation effective, I also learned about myself. I was able to reflect on myself such as finding out how I best learn. I also learned about positive and negative parts about me for when I am researching and presenting.

A future goal is for students to create their own conference posters and presentations. Meeting this objective would follow naturally from the desired expansion of the course to include student work on a CER project with a faculty supervisor.

Results from the UMass program meet a goal identified in the Boyer Commission report regarding the importance of undergraduate research to train students to communicate clearly:

> Every university graduate should understand that no idea is fully formed until it can be communicated, and that the organization required for writing and speaking [about these ideas] is part of the thought process that enables one to understand material fully. *(Boyer Commission, 1998, p. 24)*

The success of this class in bolstering communication skills is consistent with data indicating that significant participation in undergraduate research enhances communication skills, regardless of field, region, or school size. For instance, in a study by Lopatto *(2003)*, 41 research mentors were surveyed at Harvey Mudd (12 faculty), Wellesley (14 faculty), and Grinnell (15 faculty). Findings revealed that communication skills were among the top three outcomes of interest in undergraduate research experiences in the STEM fields. Similar results were found by the same author in a survey of 1,100 students from various institutions *(Lopatto, 2005)*. In another study by Salsman, Dulaney, Chinta, Zascavage, and Joshi

(2013), 44 undergraduates assessed the benefits of participating in a research project on a scale of 0 (not at all helpful) to 4 (extremely helpful). Overall, students assigned an average rating of 2.94 to their increase in communication skills (oral, visual, and written), collaborative skills, and leadership skills.

Research strengthens communication skills, whether carried out at large state universities or small liberal arts colleges. In a National Science Foundation funded study of engineering students conducted by Ing, Fung, and Kisailus *(2013)*, public communication skills were reported to have improved "demonstrably" over a 10-week period when students working on faculty research projects got two things: (1) mentoring related to the experiment's purpose and interpretation of results and (2) repeated chances to share their own thoughts. Although the study was small ($n = 8$), it offers an important message: Opportunities to actively engage in the research process and interpret findings correlate positively with the ability to communicate with diverse audiences.

More studies are needed to conclusively attribute improved communication skills to undergraduate research experiences. However, these preliminary findings are encouraging. If expanded, the UMass course could go even further to cultivate communication skills. Ideally, the course would routinely include involvement with an actual field-based project, with students talking to community members to formulate questions and collect data, then conveying findings and their significance to faculty mentors and peers.

Critical thinking skills. Can CER sharpen critical thinking skills? The UMass class suggests that it can. In course assessments, students reported particular benefit from being asked to write a research question. For many, this was a novel and challenging experience. A graduate of the course described how the process pushed her to think in a new way:

> I had to figure out what the questions even were. Through that process I was forced to dig deeper and figure things out I would never have touched in a lecture-based class. It certainly led to some of the best work and the best learning I've done, so I'm incredibly grateful.

Having students generate research questions is but one instance of the inquiry-based pedagogy used throughout the class. For instance, in the module on applying CER guidelines, students pose solutions to a problem rather than reciting information. Multiple units in the course (on research questions, application of

CER guidelines, and research challenges) promote inquiry-based learning as a prod to critical thinking.

Literature on the benefits of inquiry-based learning is extensive. As Lee *(2011)* notes, inquiry-based learning "develops abilities and attitudes valued by proponents of both liberal and professional education and by those who feel that higher education should equip students for the varied demands of modern life including the requirements of the work place" *(p. 152)*. More than four decades earlier, Perry *(1970)* reported that inquiry-based learning empowers students to make good decisions and exercise good judgment even when uncertain, which is a foundation of intellectual growth and maturity *(pp. 79–88)*. By including students in a real-world problem-solving process, the promise is great: Increasing undergraduate CER work can sharpen the critical thinking ability that employers seek.

Respectfulness. Although CER is not the only type of approach that promotes students' critical thinking, it holds unique benefits for cultivating interpersonal respectfulness. Students who participate in CER emerge with a sense of their shared humanity with groups who were once their "other." Qualitative course assessment data and end-of-semester evaluations are clear: Over the term, students expressed an unmistakable desire to help others meet their needs with dignity and respect. Representative student testimonies reflect the group's experience:

> I feel that I have . . . become more critical of how knowledge is produced, who controls the research process, and who has power over research findings. These are important considerations to take when doing research with people so as not to continue the often colonizing effect of research.

> [By taking this class] I have learned about the process of working with the community in order to complete scientific research that will be accepted and effective in the community. This course has taught me about the process of research.

> I have gained a lot more knowledge of what [community-engaged research] is. I learned that the participant has a partnership approach in the research. I didn't know [community-engaged research] had a goal to

> integrate the knowledge learned to improve the health and benefit of the community members.

Considering how CER differs from traditional research, this outcome is not surprising. Treating communities as equal partners, with vital insights and skills to contribute, calls for an attitudinal shift. No longer "the outside expert," community-engaged researchers sense the shared humanity that makes them as capable—and as vulnerable—as populations they work with.

The shift in attitude between student researchers and community partners mirrors the shift between teachers and students in the CER classroom. In her discussion of learner-centered pedagogy, Vella *(2002)* describes sound learning relationships that involve "respect, safety, open communication, listening and humility." She goes on to say, "The power that often exists between learner and 'professor' can be a function of a mechanistic system where power is frequently used to dominate" *(p. 11)*. Similarly, when community-engaged researchers employ learner-centered approaches, people are no longer "objects"; instead, they are respected "subjects" with valuable knowledge to share. This point of view inspired the title of the course: "Research Gets Real."

Although the partnerships with communities make CER unique in cultivating respectfulness, its other educational benefits mirror those found nationwide in undergraduate research programs. These include enhanced communication skills and stronger critical thinking, as well as inquiry-based thought processes and measurable minority success. By practicing this type of research, undergraduates at once meet the educational goals demanded by faculty, policy makers, and employers who hire university graduates.

For this reason, employers in a recent study reported satisfaction with students who had had seven specific experiences, three are provided by CER but not typically by other types of research: (1) research project carried out collaboratively with peers, (2) work with community organizations, and (3) field projects with people from different backgrounds or cultures *(Hart Research Associates, 2015)*.

Minority student achievement. Respectfulness increases when students from majority groups gain, and students from underrepresented minority groups experience, one another as colearners. Data on course enrollment since 2012 revealed that 27% of attendees self-identified as minority students; 22% were first-

generation students; and 10% self-identified as underrepresented minorities. (*First-generation students* are defined by the standard federal stipulation that neither parent holds a bachelor's degree. *Underrepresented minority* categories are American Indian/Alaska Native, Black/African American, Hawaiian/Pacific Islander, Hispanic/Latino, and those who declared multiple race/ethnicities [except Asian and White]. All data are self-reported, based on student admission materials.) Race and ethnicity data of UMass undergraduate students (U.S. citizens) from fall 2012 to fall 2016 *(University of Massachusetts Amherst Office of Institutional Research, 2016)* show that 20% were self-reported minority students and 10.5% were underrepresented minorities. Based on these numbers, the balance of populations represented by enrollment in "Research Gets Real" compares favorably to that of university undergraduates as a whole.

UMass has shown that CER specifically appeals to underrepresented minorities and first-generation students, and nationwide data suggest that underrepresented students (defined as ethnic minorities—Hispanic/Latino, African American, or American Indian—and first-generation college students, as well as less academically gifted students) benefit more from research experiences than students from ethnic majorities or college-educated families *(Finley & McNair, 2013)*. Undergraduate research increases retention and persistence rates for all students *(Finley & McNair, 2013; Kinzie, Gonyea, Shoup, & Kuh, 2008; O'Donnell, Botelho, Brown, González, & Head, 2015)*, but these effects are especially pronounced for students whose groups have been historically underserved *(Finley & McNair, 2013; O'Donnell et al., 2015)*. Undergraduate research also makes minority students more likely to follow their ambition of pursuing a research career *(Lopatto, 2007)*. In the California State University system, which serves 437,000 individuals, students were found to graduate at higher rates when exposed to "high impact" practices, including undergraduate research, service-learning, and peer mentoring. This benefit was especially pronounced among Latino students *(O'Donnell et al., 2015)*. At UMass, as elsewhere, involvement in research helps minority students succeed.

Lessons Learned. In keeping with these characteristics, two key lessons learned from this program's development and implementation phases have been the importance of (1) garnering support and (2) fostering awareness from a broad-based perspective. Therefore, plans for Phase III (sustaining the course and the program as a whole) are purposeful and ongoing. Specifically, the program has representation (Carbone) on two university-based

committees: the Provost's Committee on Service Learning and the Faculty Senate Council on Public Engagement and Outreach, which provide reports to the faculty senate and other academic boards.

Also under discussion are strategies for expansion (to a two- or three-credit course that includes a community-based field component) and plans for a more rigorous long-term assessment. Proposed strategies include developing a database to follow students to determine how they're using the knowledge and skills from the course; interviewing employers to determine how to more purposefully link their needs to program outcomes; and exploring development of evaluation questions to assess growth in affective skills, using Bloom's updated taxonomy by Anderson et al. *(2001)* to assess sensitivity to individual values, cultural diversity, and social improvement, as well as ethical judgment and valuing others.

Again, undergraduate research satisfies constituents both internal and external to the university. University mission statements commonly allege a commitment to diversity, and employers of recent graduates are asking for a more diverse talent pool. CER can help provide this benefit: When minority students partner with minority populations similar to their own home communities, student buy-in predictably increases.

With community-engaged undergraduate research solving problems cited by educators and employers alike for decades, why are such programs not standard offerings around the country? The answer lies in the philosophical commitments, cultural habits, and financing mechanism of academe generally, and of large research universities specifically.

Next Steps for this Course

The benefits of this course could be amplified with expansion and continuing modification. The following steps would strengthen the course in the future:

1. Expansion from one credit to three.
2. Inclusion of a field component in which students conduct community-engaged research with a faculty mentor.
3. Addition of new material on implicit bias.
4. Rather than just evaluating others' work, students would create their own posters and oral presentations to deliver the results of their work.
5. Addition of evaluation of affective skills development.

6. Measurement of long-term influence on student trajectories and effects on communication skills.

Next Steps for the Field: The Necessity of Institutional Support

It is not enough to continue documenting the benefits of community-engaged research. The educational successes of this and other trials in the field have created a national climate in which "[u]ndergraduate research has become a byword. Every research university at least claims to have it" *(Kenny, 2003, p. 103)*. Indeed, many campus tours illustrate the pride that universities take in their undergraduate research opportunities. The question is, Are we delivering on our admission promises? Often the answer is, "Not enough."

Performance rarely matches rhetoric, due to competing priorities that especially plague major research universities. Our data add to the literature showing that undergraduate research generally, and CER specifically, develops precisely the skills that various constituencies have requested for decades. Further data on the efficacy of research assignments is not needed; however, alignment of incentives within research universities is still required if the future is to see a decisive curricular shift that no amount of evidence has generated thus far.

The institutional support most urgently needed is a revision of promotion and tenure policies. A critical study of large, decentralized research institutions by Demb and Wade *(2012)* found tenure policies to be the jewel in the crown of needed shifts in department-level culture, policies, and procedures. Furthermore, a 10-year review of engagement efforts published by Sandmann *(2008)* concurred with earlier findings of Bartel, Krasny, and Harrison *(2003)* that "universities can systematically address the demands for more social engagement only by exploring new reward and administrative structures" *(p. 89)*.

The need to revise promotion and tenure policies as part of an overhaul of the core culture of research universities is not a new and surprising finding. The Boyer Commission report *(1998)* traces the failings of universities to the segregation of research and teaching in campus culture, university vision, course design, and faculty compensation. The Boyer Commission strongly urged faculty and graduate students to include undergraduates in framing research questions, seeking answers, and presenting findings—that is, to treat them as insiders on research projects *(p. 17)*. The years since its

publication have proven it downright prescient. The report asked research universities of the future to offer undergraduates "greater expectations of writing and speaking, more active problem-solving, and more collaboration among . . . graduate students, and faculty" *(p. 21)*. The report further envisioned how "scholar-teachers would treat the sites of their research as seminar rooms in which not only graduate students but undergraduates observe and participate in the process of both discovery and communication of knowledge" *(p. 18)*.

The most radical—and arguably the most urgent—recommendation of the Boyer report remains a dream deferred: to "replace . . . . [t]he old definitions of workload" *(Boyer Commission, 1998, p. 15)*. If undergraduate education becomes a priority of research universities, tenure and promotion committees will face the difficult task of assessing a skill—undergraduate teaching that incorporates research—that is nearly impossible to measure *(Boyer Commission, 1998, p. 3)*.

Redefining faculty contributions is all the more challenging in the case of CER. Even if it leads to publication, this type of research is not necessarily recognized as an indication of faculty productivity. Based on its work with over 450 institutions since 1996, the Council on Undergraduate Research found that the single most persistent obstacle to implementing undergraduate research is changing the academic culture to reflect the value of this practice *(Malachowski et al., 2015)*.

Promotion policies that punish or ignore CER persist even when universities cite engagement as a top priority. Such institutional inconsistencies have led many to describe a gap between the rhetoric and the reality in universities that claim to prioritize undergraduate research generally and community-engaged research specifically. At North Carolina State University, for example, a public commitment to community engagement coincided with a reduction in funds for initiatives that support engagement *(Jaeger, Jameson, & Clayton, 2012, p. 150)*. Such findings are especially common among research universities *(Jaeger et al., 2012, p. 159)*. Even universities earning the "community engagement" designation from the Carnegie Foundation for the Advancement of Teaching may "fail to make modifications to core policies that support engagement (such as promotion and tenure)" *(Demb & Wade, 2012, p. 338)*. These incongruities persist, despite widespread initiatives to recruit university presidents who stress service *(Bringle & Hatcher, 2000, pp. 274–275*).

Such issues are also nothing new. In its most biting criticism, nearly 20 years ago the Boyer report claimed,

> Again and again, universities are guilty of an advertising practice they would condemn in the commercial world. Recruitment materials display proudly the world-famous professors, the splendid facilities and the ground-breaking research that goes on within them, but thousands of students graduate without ever seeing the world-famous professors or tasting genuine research. *(Boyer Commission, 1998, pp. 5–6)*

The persistence of outdated promotion and tenure policies points to the need to reconcile competing priorities in the core mission of research universities. Research and teaching often dominate promotion and tenure policies of institutions that mention service in their mission statements *(Bringle & Hatcher, 2000)*. Land-grant universities face further conflict, as they were founded largely to bring faculty research to bear on issues in local and regional development. They, too, do not provide adequate funding support for community-engaged projects, nor do they consistently offer reappointment, promotion, or tenure to faculty whose productivity issues from these spheres *(Jaeger et al., 2012)*.

Once clear in their commitment, universities should implement numerous practical steps that have already shown promise of success. The UMass experience corroborates Sandmann's *(2008)* suggestion that an undergraduate course in community-engaged research be institutionalized. Our experience also supports the common suggestion that nongrant funding of designated administrative time solidifies the founding of such a course, at least in its crucial development phase.

These recommendations from UMass complement best practices that arise in the literature. Increasing community buy-in has helped some campuses strengthen their programs *(Demb & Wade, 2012, p. 342)*. Establishing internal funding sources independent of grant awards promotes much-needed continuity. Campus efforts should also include faculty from different departments and different career stages *(Jaeger et al., 2012)*.

Less tangible changes would also promote CER. Enos and Morton *(2003)* captured a vital component of CER when they called for "transformational" partnerships that might shift identities and values over "transactional partnerships that promise no mutual growth or change" *(p. 20)*. Saltmarsh, Hartley, and Clayton *(2009)*

rightly encourage a transition from technocratic campus culture to democratic culture. Future CER programs should also adopt the four practices that have made service-learning work at other institutions: (1) garnering support from the board of trustees and academic senate, (2) fostering awareness of presidents and chancellors regarding such support, (3) establishing a systemwide research center with dedicated resources, and (4) allowing campuses the autonomy to tailor interventions to fit their structure and needs *(O'Donnell et al., 2015)*.

Academic departments will build on the gains made in CER only with strong, steady institutional support not subject to the whims of external funding sources and administrative turnover. Anecdotes of programs starting, stopping, and starting over under new leadership are not uncommon and reflect another shortcoming of the current approach.

Other institutional factors further impede long-term continuation of CER programs. Commonly cited obstacles include insufficient buy-in from faculty, lack of sustained program budget for undergraduate research, no system for incorporating research into all undergraduate classes, and no adjustments to faculty workload. Malachowski et al. *(2015)* concluded that the challenge of positioning research as a key component in undergraduate education will require both institutional and systematic support to compensate faculty.

By contrast, one campus with strong institutional support for undergraduate research has enjoyed program longevity and success. The University of Michigan's University Research Opportunity Program has grown from 14 student–faculty research partnerships in 1988 to over 1,300 undergraduates and 800 faculty *(University of Michigan College of Literature, Science, and the Arts, 2016)*. Prospective mentors are offered $500–$800 per project, and participating students get one to four course credits per semester. Students and faculty are supported by campus workshops on specific skills to use in research projects, such as GIS and data analysis. Students are assigned peer advisors who are alumni of the program, and they present their research findings in an annual poster session.

Michigan's program shows that even small faculty incentives can greatly expand undergraduate opportunities. Its highly structured program, integrated with campuswide supports, is exemplary, but not representative. At most schools, educational gains to the undergraduate population are not part of the formula when

resources are allocated, despite the popularity of "research opportunities" in admissions literature.

This disconnect will likely continue if reformers do nothing more than demonstrate the educational enhancement or workforce demand that support expansion of CER courses and programs. The more urgent task of confronting cultural and political obstacles to change shows a few promising developments. If, as Weerts *(2015)* contended, research with a public engagement component might actually increase state funding for large universities, this prospect might offer a compelling motive for administrators to invest in community-engaged research *(pp. 20–25)*. Although Weerts *(2015)* defines engagement to the exclusion of research, any relevant research with clear benefit to local communities would satisfy his criterion that people in the state receive tangible benefits from university activity.

Schools that make incremental changes stand to benefit society and meet the pressing needs of the day. "By the senior year," the Boyer Commission report *(1998)* envisioned, "the able undergraduate should be ready for research of the same character and approximately the same complexity as the first-year graduate student" *(p. 17)*.

Conclusion

National deficits in academic preparation for citizenship, graduate work, and employment call for a sustainable model to systematically support undergraduate community-engaged research as a course included in curricula and as a practice receiving programmatic support from universities. Findings from our program corroborate nationwide findings that undergraduate research promotes the skills that today's graduates lack; our findings also demonstrate that CER specifically fosters even stronger character and more skills needed in the 21st century workforce. Expanding such programs to meet the national crisis of underprepared college graduates requires institutional support that would reverse deep cultural traditions and financial priorities of major research universities. Bringing about urgently needed changes requires challenges to these traditions and priorities that will result in their reversal.

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