



Council on Undergraduate Research

*Building Undergraduate Research Access and Equity:
Scaling, Scaffolding, Assessment, and Partnerships*

Elizabeth Ambos, Executive Officer

NERIC Meeting – August 17, 2017



What Shall We Discuss?

- Equity and access to undergraduate research (UR): expansion and enhancement of UR is timely and urgent
- How do I know if my institution has characteristics that support expansion and enhancement right now?
- What are some ways to scale-up UR cost-effectively?
 - Co-curricular experiences - intensive summer research
 - Integrating research into the curriculum and scaffolding research as a developmental process
 - Incentives for students and faculty - “giving a gift...not a burden”

✓ **Assessment**

✓ **Partnerships**



Council on Undergraduate Research (CUR)

- *The mission of the Council on Undergraduate Research is to support and promote high-quality undergraduate student-faculty collaborative research and scholarship*
- **Eleven discipline-based divisions:** Arts & Humanities, Biology, Chemistry, Education, Geosciences, Health Sciences, Mathematics & Computer Science, Physics & Astronomy, Psychology, Social Sciences, Engineering.
- **Two multidisciplinary, administrative-based divisions:**
 - At-Large and Undergraduate Research Program Directors.
- From central core of small PUI four-year college membership - rapid expansion to **comprehensives**, research-intensive and community college institutions; about half are public institutions



CUR Membership

13,000+ Individual Members
>700 Institutional Members

including institutions in Canada, Chile, Germany,
UAE, Qatar





CUR Membership Benefits

- Networks of experts
- Opportunities to showcase your research accomplishments and learn from others
- Connections to the larger issues in higher education
- Discounts on a variety of information resources and professional development opportunities



What Shall We Discuss?

- **Equity and access to undergraduate research (UR): expansion and enhancement of UR is timely and urgent - WHY?**
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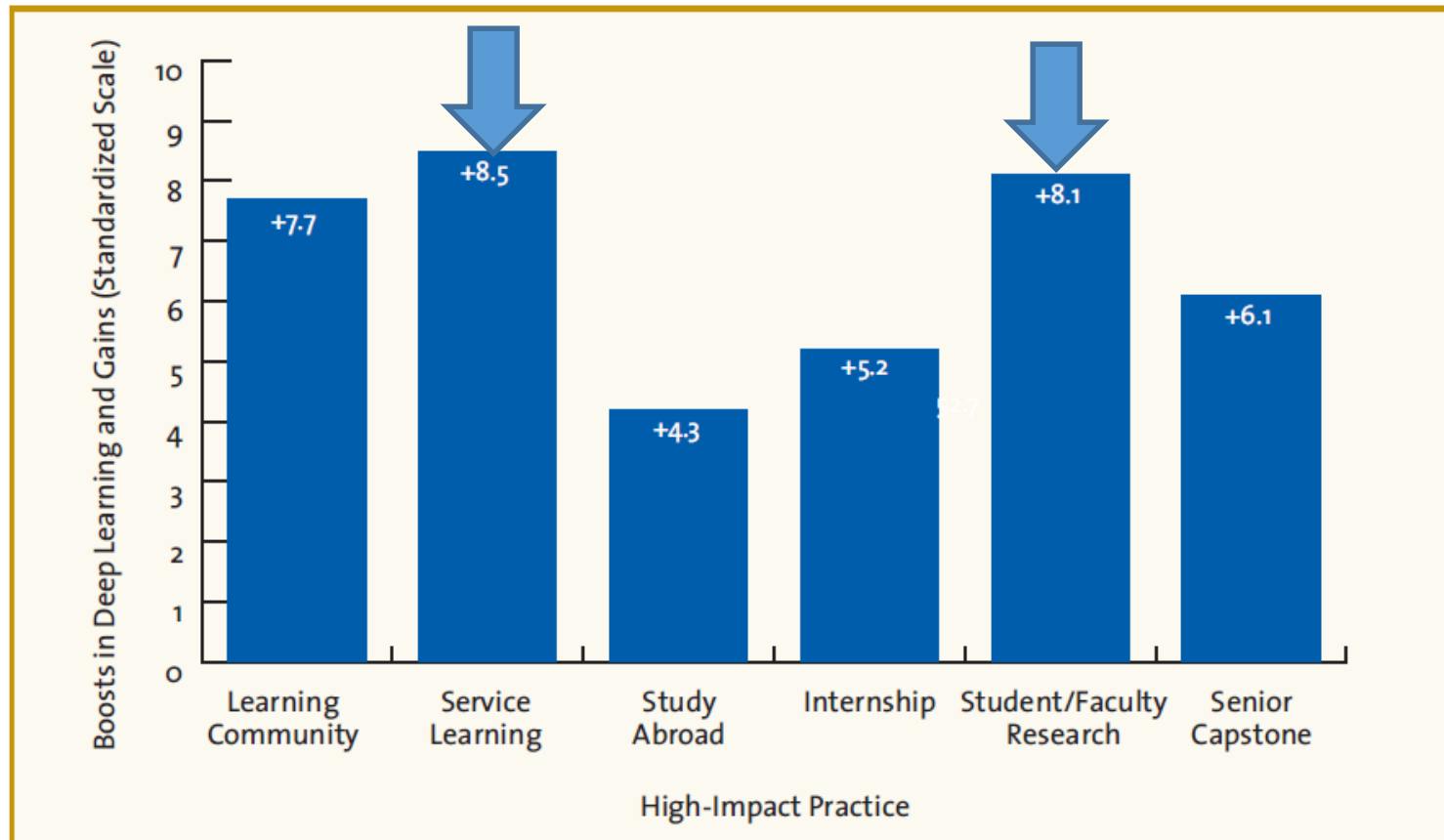


UR: “First Among Equals” to Enable Student Success

- Federal funding of STEM research (e.g. IDeA) provides significant support for UR, allowing institutions to leverage other resources
- Faculty advancement tied to research, teaching, and service: UR can support all three
- Other **high-impact practices (HIPs)** and student success initiatives can be included in UR programming, particularly with centralized UR office
- NERIC consortium has unique opportunity to build regional research networks - combining UR with service learning and job creation

High Impact Practices (HIPs): Effect on Underserved Undergraduates (Finley & McNair, 2013)

Average Boost to Students' Perceptions of Their Deep Learning and Gains
by Participation in Specific High-Impact Practices





Why is UR “First among Equals” (cont.)

- **Student Benefits from UR**
 - ❖ Cognitive and Intellectual Growth
 - ❖ Professional Growth and Advancement - GPA/retention - preparation for MD/PhD (AAMC statement)
 - ❖ Personal Growth and Development
- **Faculty Benefits from UR**
 - ❖ Research, Scholarly, and Creative Outcomes - UR particularly effective for high-risk/exploratory research
 - ❖ Mentoring and Teaching
 - ❖ Job Satisfaction and Personal Development
- **Institutional Benefits from UR**
 - ❖ Learning Outcomes
 - ❖ Faculty Quality and Morale
 - ❖ Recruitment and Recognition

Osborn & Karukstis, 2009



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- How do I know if my institution has characteristics that support expansion and enhancement right now?
- What are some ways to scale-up UR cost-effectively?
 - Co-curricular experiences - intensive summer research - small group
 - Integrating research into the curriculum and scaffolding research as a developmental process - large group
 - Incentives for students and faculty - “giving a gift...not a burden”

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President's Council of Advisors on Science and Technology Undergraduate Research: A Right Not a Privilege

- *PCAST Recommendation: Advocate and provide support for replacing standard laboratory courses with discovery-based research courses.**

*From: PCAST Report: "Engage to Excel", released February 27, 2012



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CUR's Publications

Tell the Story of UR Transformation



Characteristics of Excellence in Undergraduate Research (COEUR)



NEW DIRECTIONS FOR HIGHER EDUCATION | 169 | ENHANCING AND EXPANDING UNDERGRADUATE RESEARCH: A SYSTEMS APPROACH | JOSSEY-BASS

»

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Enhancing and Expanding Undergraduate Research: A Systems Approach



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FACULTY SUPPORT AND UNDERGRADUATE RESEARCH: Innovations in Faculty Role Definition, Workload, and Reward

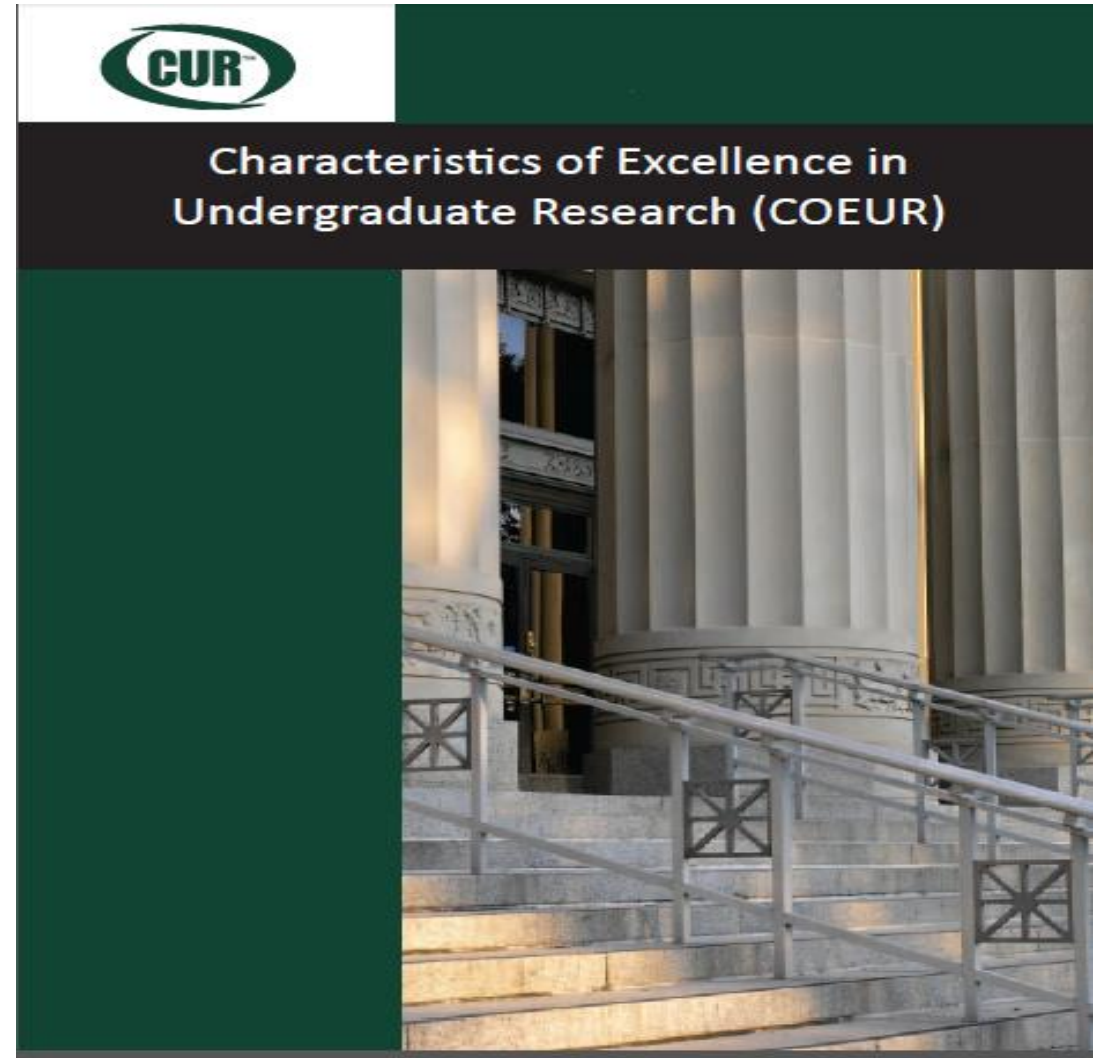


Edited by:
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Council on Undergraduate Research

COEUR - Characteristics of Excellence in Undergraduate Research

- ❖ Key Factors for UR success:
- ❖ Establishment of central UR campus office
- ❖ Extensive student/faculty participation in campus celebratory events
- ❖ Development of consistent assessment of UR's impact
- ❖ Establishment of policies for recognizing/rewarding faculty engagement in UR





The 12 Characteristics of Excellence

- ❖ **Campus mission and culture**
 - ❖ e.g., institutional commitment
- ❖ **Administrative support**
 - ❖ e.g., UR program office
- ❖ **Research infrastructure**
 - ❖ e.g., space, instrumentation and equipment
- ❖ **Professional development opportunities**
 - ❖ e.g., research leaves, mentorship training



The Characteristics cont.

❖ Recognition

- ❖ e.g., UR in promotion and tenure guidelines

❖ External funding

- ❖ e.g., institutional funding for research

❖ Dissemination

- ❖ e.g., peer-reviewed publication, exhibition, or performance; student research conferences

❖ Student-centered issues

- ❖ e.g., community of student scholars



The Characteristics cont.

❖ Curriculum

- ❖ e.g., integration of teaching and research; student course credit for research

❖ Summer research program

- ❖ e.g., faculty & student compensation

❖ Assessment activities

- ❖ e.g., assessment of student learning

❖ Strategic Planning

- ❖ Are goals for UR advancement embedded in strategic plan (which often ties to development initiatives)



Using COEUR as a Diagnostic Tool

- Take a ten minutes to do an institutional COEUR profile
- Share your findings - how would you “grade” your institution?
- ***Without additional funding from your institution (or NIH)*** faculty, administrators, and students have significant impact on:
 - setting vision/strategic plan to include investment in UR
 - faculty recruitment and retention policies
 - research infrastructure - particularly dual use/equipment refresh/sharing and maintenance strategies policies
 - curricular policies, including space utilization
 - how students get compensated for research
 - financial aid considerations



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 - *Co-curricular experiences - intensive summer research*
 - **Integrating research into the curriculum and scaffolding research as a developmental process**
 - **Incentives for students and faculty - “giving a gift...not a burden”**

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UR Curricular Scaffolding

- What this means: UR is included in all courses in the degree program; and is developmentally scaffolded so that early experiences build toward senior capstone/independent study
- Barriers:
 - content “coverage” and accreditation often cited as reasons why more open-ended research-based curriculum can’t be adopted
 - Lecture halls don’t lend themselves to inquiry and open discussion
 - Laboratory sections “cook book”
 - Large numbers of adjunct faculty can mean uneven adoption of research into the curriculum
- Solutions:



UR Curricular Scaffolding

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- Barriers to early undergraduate research:
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 - Lecture halls don’t lend themselves to inquiry and open discussion
 - Laboratory sections “cook book”
 - Large numbers of adjunct faculty can mean uneven adoption of research into the curriculum
- Solutions:
 - Start small: start by incorporating one open inquiry lab exercise in beginning biology- prominent example - Graham Hatfull’s Phage-Hunters project
 - Use region’s biomedical infrastructure to source research mentors and advisors
 - Experiment with reducing content “coverage” through project-based research in courses



Faculty Reward/Incentives

- What this means: UR mentoring is acknowledged in faculty retention/tenure/promotion guidelines and reward systems
- Barriers:
 - We've (always/never) done it that way!
 - Can't figure out what category - teaching, research, service - to which UR mentorship belongs
 - Can't figure out how to give credit for faculty mentorship outside or inside the classroom
- Solutions:



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- Solutions:
 - faculty who mentor UR in independent study accrue credit toward assigned time in future semesters
 - consider counting UR mentorship in teaching *and* research
 - to strengthen the “research” credit, consider “extra credit” for publications that involve undergraduate student co-authors
 - consider aligning hiring and interview protocols, letters of appointment, and retention/tenure/promotion to all emphasize student mentoring



Student Reward/Incentives

- What this means: UR is a paid experience and/or students receive course credit
- Barriers:
 - no \$ for extracurricular participation
 - no course-based UR
 - even if course-based, more work needed from students to engage thoroughly - conflicts with job and family obligations
- Solutions:



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- Solutions:
 - Year round Pell is now back! Consider moving summer intensive research experiences to course-based; now more accessible to students on financial aid
 - Federal Work Study \$\$ - can certainly be used to support undergraduate research assistants
 - Industry subscription approach - work with local biomedical firms to create research programs for a fee-based services
 - Apply for student organization funds - particularly for travel funding

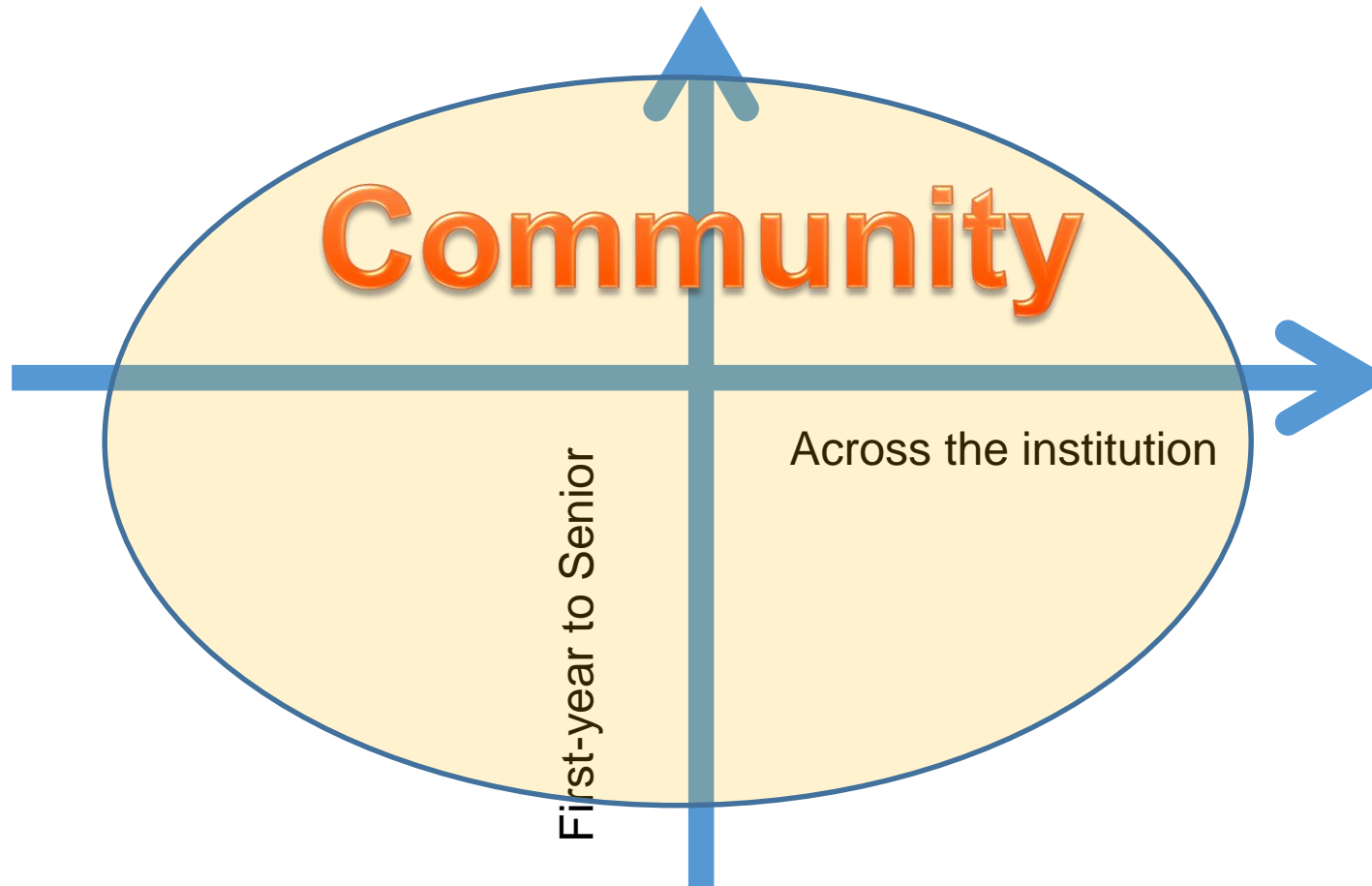


Differentiated Strategies Needed

- Faculty issues
 - Often, women and faculty of color called upon to mentor and coach many UR students
 - research investments are not evenly distributed among departments - need both STEM and non-STEM investments
 - faculty mentorship - where are the role models on how to mentor?
- Student issues
 - Pell - with transition to year round Pell, more students may have financial means to take intensive summer UR courses - but need to clarify impact on units accrued toward degree programs
 - Federal Work Study - currently at risk in terms of proposed cuts
 - Interactions between fellowship awards and financial aid complex
 - Work-life balance - can child and elder care be included in the package of student support?



UR Expansion: Horizontal and Vertical Integration





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Promising Assessment Strategies

- Intensive summer research experiences
 - SURE, SALG, EvaluateUR
 - Assessments used in NSF REU (Research Experiences for Undergraduates)
- Course-based experiences
 - Coding curriculum to distinguish research-intensive courses from non-research intensive
 - CURE (David Lopatto)
- Presentations and publications
 - Chart yearly attendance of numbers of undergraduates presenting on-campus, and at regional meetings (e.g. NERIC)
 - Support students' presentations at disciplinary societies and NCUR
 - Count numbers of publications authored/co-authored by students
 - Archive capstone and honors theses in library holdings



CUR Resources

- Zotero bibliographies - Assessment and Integration of Research into the curriculum
- Assessment webinar series
- Community platform for free exchange of ideas of assessment approaches
- CUR's peer-reviewed journal - Scholarship and Practice of Undergraduate Research will focus heavily on assessment
- NSF-funded WIDER and IUSE grants provide cutting-edge research on how to assess UR impact and department transformation



EvaluateUR Assessment Approach

- Funded by NSF DUE's WIDER program
- Intended to support faculty and institutions through implementation of evidence-based teaching and learning
- Supporting scaling-up of a proven model for evaluating undergraduate research
 - In place at SUNY Buffalo State since 2008



EvaluateUR Structure

- Transparent and embedded in program
- Students and mentors perform parallel assessments using identical outcome categories and scoring rubrics
- Option for each mentor-student team to identify and add outcomes for their particular project

11 Outcomes Categories

Communication

Creativity

Autonomy

Ability to deal with obstacles

Practice and process of inquiry

Nature of disciplinary knowledge

Critical thinking and problem solving

Understanding ethical conduct

Intellectual development

Culture of scholarship

Content knowledge skills/methodology



CUR Transformations: NSF IUSE

- A key goal described by virtually all institutions with which CUR has worked is to create a more research-rich, connected, and scaffolded curriculum.
- Institutional teams invariably discover that curricular reform requires a long time arc and poses significant challenges, such as:
 - ❖ Gaining an understanding of the different disciplinary cultures.
 - ❖ Rethinking faculty workload and reward systems for both tenure-line and non-tenure-line faculty.
 - ❖ Developing sustainable faculty leadership structures, particularly against a backdrop of administrative and faculty turnover.
 - ❖ Establishing strong partnerships among faculty, students, and administrators.
 - ❖ Expanding student participation.
 - ❖ Scaffolding curricular elements linked to student learning outcomes.
 - ❖ Partnering with students to fundamentally change the learning process.



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Partnerships

- Internal partners
 - Financial aid
 - Student associations
 - Student affairs professionals
 - Institutional Research
 - Development
- External partners
 - Local medical centers and hospitals - a real IDeA strength
 - Biomedical firms - source of “research apprenticeship” placements
 - What other sources of partnerships do you think will help support NERIC constituents?

How can CUR help your campus?

UPCOMING CUR OPPORTUNITIES

CUR Resources

Promote and support undergraduate student-faculty research and scholarship

MEETINGS

National Faculty Conferences

National Conference on Undergraduate Research

REU Symposium

Posters on the Hill

CUR Dialogues

Institutes & Workshops

SERVICES

Consulting Services

Mentor Networks – UR registry

Grant Preview Service

CUR Fellows/Goldwater Scholars/AURA Awards

Community platforms (Higher Logic)

Advocacy

PUBLICATIONS

Scholarship and Practice of Undergraduate Research
Volumes

“How To” Series

Specialized



Faculty and Administrators

- Creative Inquiry in the Arts and Humanities - specialized institute for arts and humanities faculty who are interested in increasing UR on their campuses
- Initiating and Sustaining an Undergraduate Research program - good beginning institute for any campuses that haven't yet centralized their UR offices and built substantial infrastructure
- Broadening Participation in Undergraduate Research - addresses issues of diversity and inclusion UR
- CUR Dialogues - GREAT for faculty and research administrators looking to increase grant funding and build contacts with federal agency grant officers
- CUR Biennial Conference - GREAT way to learn and showcase your UR strategies and programs



Students

- NSF Research Experiences for Undergraduates Symposium
 - October 22-23, 2017
 - Westin Alexandria (adjacent to NSF headquarters)
 - **Application deadline - August 31, 2017**
 - Notifications - mid-September, 2017
- Posters on the Hill - UR students present on Capitol Hill - highly selective - JSC a recent awardee!
- National Conference on Undergraduate Research - particularly helpful for rising juniors - large conference (4000) - 100+ grad schools
- Registry - FREE to all students - allows you to post information concerning your graduate school interests and UR background - then accessible to graduate school recruiters



Acknowledgments

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