Democratizing UR: Scaffolding for and Integrating Research Experiences to Elevate Equity and Inclusion



**Rosalie A. Richards, Ph.D.**

**Stetson University**

**Elizabeth Perry-Sizemore, Ph.D.**

**Randolph College**

***Workshop at the 2020 CUR Virtual Biennial Conference***

***July 1, 2020***

Education is for improving the lives of others and for leaving your community and world better than you found it.

-Marian Wright Edelman

**BIOGRAPHIES**

**Rosalie A. Richards** (she/her/hers) is Associate Provost for Faculty Development and Professor of Chemistry and Education at Stetson University. She earned a B.S. in chemistry with physics from the University of the Virgin Islands and a Ph.D. in chemistry in 1990 from the University of Southern California.

A porphyrin chemist with research interests in equity in higher education, Rosalie has directed numerous award-winning undergraduate research senior theses and high school student research projects including a CURE collaboration with the Harrisburg community garden to assess soil chemistry. Rosalie serves frequently as institute facilitator for the Council on Undergraduate Research and is currently a consultant for the NSF-supported CUR Transformations Project. Rosalie is also co-developer (with Elizabeth Perry-Sizemore) of the course “Integrating Undergraduate Research Across the Curriculum,” in Epigeum’s Research as a Transferable Skill program (project lead Julio Rivera). She is co-author ofthe *International Journal for the Scholarship of Teaching and Learning* article, “Empirical Study: Mentorship as a Value Proposition (MVP)”, with D. Sams, R. Lewis, R. McMullen, J. Hammack, L. Bacnik, and C. Powell.

As associate provost, Rosalie is responsible for leading all aspects of teacher-scholar faculty development and support. Her focus is on enhancing excellence and innovation in learning, facilitating an inclusive learning environment of intellectual vibrancy, and empowering lifelong success and significance. A priority of her work is to advance leadership of student integrative learning as a Stetson core experience through undergraduate research, creative inquiry, and other experiential engagement.

Prior, Rosalie was the first Kaolin-Endowed Chair in Science Education and Georgia Eminent Scholar and Professor of Chemistry at Georgia College & State University. As Kaolin chair, she became the founding director of the award-winning Science Education Center, where she provided oversight of several university and university-community partnerships that were instrumental in collaboratively soliciting over $10 million in private, state and federal funding. Rosalie is a strong advocate for mentored student research. During her tenure at Georgia College, she led the development of a vision and action plan for elevating undergraduate research and creative inquiry as an institutional distinctive.She is a national leader in STEM equity and in bolstering university climates free from bias. Her passion work focuses on increasing the number of students underrepresented in the physical sciences through research activity. At Georgia College, she led the *Institutionalizing Undergraduate Research Initiative*, which elevated the practice and impact of mentored undergraduate research.

At Spelman College, she served as the first NASA-NSF Model institutions for Excellence Scholar-Teacher in Chemistry. Since the start of her professional career at Spelman in 1996, Rosalie’s most significant achievement has been mentoring 87 high school and undergraduate students in the craft of chemical research. All have pursued post-baccalaureate degrees in STEM, medicine, education, dentistry, allied health, and law, with approximately 70% identifying as students of color.

*Contact*: rrichar1@stetson.edu (386) 822-7906

**Elizabeth Perry-Sizemore** (she/her/hers) is Head of the Division of Social and Behavioral Sciences and the Catherine Ehrman Thoresen and William Thoresen Chair of Economics in the Department of Economics and Business at Randolph College. She earned her Ph.D. in economics from Virginia Polytechnic Institute and State University in 2004. She is a Phi Beta Kappa graduate of Randolph-Macon Woman’s College (R-MWC).

Liz is the past director of the competitive and college-wide Student/Faculty Summer Research Program at R-MWC and past chair of Randolph’s Symposium of Artists and Scholars.  In her earlier role as an Assistant Dean, she helped design and participate in the selection process for the Randolph Innovative Student Experience (RISE) program, which awards grants to Randolph students to pursue scholarly and creative endeavors and was instrumental in the design and administration of new faculty orientation and mentoring at Randolph.

Liz is an elected Social Sciences Councilor with the Council on Undergraduate Research and an experienced facilitator at CUR’s Social Science Institutes, helping teams of faculty and administrators from other institutions develop proposals for enhancing undergraduate research on their own campuses and speaking on curricular scaffolding for undergraduate research experiences.  In addition to her service for CUR, she has co-facilitated faculty development workshops at various institutions and has served numerous times as an external reviewer for economics departments.

Liz is the author of “Starting a Research Project” and the co-author (with Rosalie Richards) of “Integrating Undergraduate Research Across the Curriculum,” both courses in Epigeum’s Research as a Transferable Skill program (project lead Julio Rivera). Liz is the student research module coordinator for the National Science Foundation-funded *Starting Point: Teaching and Learning Economics*, a pedagogic portal project developed by economists in collaboration with the Science Education Resource Center of Carleton College (National Science Foundation Grant DUE0817382, $497,953, PIs: M. Maier, C. Manduca, K. McGoldrick, S. Simkins). She is the coauthor of *The American Economist* article “Creating Quality Undergraduate Research Programs in Economics: How, When, Where (and Why)” with Steve DeLoach and Mary Borg.

Liz advises independent undergraduate research projects in a number of her classrooms, but also engages in student/faculty community-based research collaborations with undergraduate students through paid summer research positions, independent studies, experiential learning opportunities, and service learning courses. This work focuses on the impacts of non-profits in low-income communities and on participatory, asset-based community development approaches to neighborhood planning.

Liz serves on the boards of three local non-profits, including the spoken word and youth mentoring organization The Listening, Inc., for which she was a member of the Steering Committee to bring Central Virginia its first Children’s Defense Fund Freedom School on the campus of Randolph College.

*Contact*: epsizemore@randolphcollege.edu (434) 947-8504

**ABSTRACT**

 4

What would universities/colleges look like if we reimagined undergraduate research through an equity lens? What would be our learning outcomes? How would all learners participate in this intellectual journey, irrespective of discipline? What would they do? How would we know that they were developing empowering forms of agency and competence to learn again in any situation? What important conceptual and pedagogical tools would we need?

Community-based and service learning research experiences offer powerful models of educational equity through engaged scholarship. During this workshop, you will first consider examples from chemistry and economics, review a toolkit of strategies for scaffolding research to support equity and inclusion, then draft and workshop a plan for advancing research customizable to your individual courses, department, or institution.

All learners welcome!

**LEARNING OUTCOMES**

*During this workshop, you will*

* explore what it means to consider undergraduate research with equity and inclusivity lasiks
* probe, unleash, and build on existing strengths for realizing equity and inclusion in undergraduate research within and across curricula at your institution
* share practices of promise with one another
* acquire a toolkit of strategies for activating cognitive and affective learning and for scaffolding research experiences to better achieve equity and inclusion in undergraduate research through student learning opportunities at your own institution
* draft and workshop a plan for advancing equitable and inclusive undergraduate research across the curriculum, customizable to your individual course instructors and/or to your institution and department.

**KEY TERMS**

5

**AFFECTIVE DOMAIN**: the manner in which we deal with things emotionally, such as feelings, values, appreciation, enthusiasms, motivations, and attitudes

**APPRECIATIVE INQUIRY**:the act of recognizing the best in people or the world around us; affirming past and present strengths, successes, and potentials; to perceive those things that give life (health, vitality, excellence) to living systems

**ASSET MAPPING**: inventorying to collect information about the strengths and resources of a community and to help uncover solutions

**COGNITIVE DOMAIN:** learning skills predominantly related to mental processes; learning processes include a hierarchy of skills involving processing information, constructing understanding, applying knowledge, solving problems

**COMMUNITY-BASED/SERVICE LEARNING:** an intentional pedagogical strategy to integrate student learning in academic courses with community engagement; emphasizes sharing and reciprocity, partnerships, and shared knowledge-making defined by mutual respect by partners (University of Colorado Boulder)

**DEMOCRATIZE:** to make (something) accessible to everyone; to not privilege any individual or population; to remove gatekeepers that create bottlenecks at the gateway of the resource

**EQUITY:** access to what individuals need to be successful; the qualities of being fair and impartial; the creation of opportunities for historically underserved populations to have equal access to and participate in educational programs that are capable of closing the achievement gaps in student success and completion (Association of Colleges & Universities)

**EQUITY LENS/LASIK:** the unceasing practice of and advocacy for employing a value system rooted in social justice

**INCLUSION:** the active, intentional, and ongoing engagement with diversity—in the curriculum, in the co-curriculum, and in communities (intellectual, social, cultural, geographical) with which individuals might connect—in ways that increase awareness, content knowledge, cognitive sophistication, and empathic understanding of the complex ways individuals interact within systems and institutions (Association of Colleges & Universities)

**INTEGRATING RESEARCH:** purposeful and effective implementation of curricular design strategies across the arc of the learning experience to bolster affective and cognitive learning domains

**LEARNING OBJECTIVE/OUTCOME:** sometimes used interchangeably, is a measurable observable description of actions a student must demonstrate at the conclusion of an engagement, activity, module, course, etc.

**REFLECTION:** the ability to deliberate on one’s actions in order to engage in continuous learning

**SCAFFOLDING:** a variety of instructional techniques used to move students progressively and developmentally toward stronger understanding and, ultimately, higher order affective and cognitive learning and greater independence in the learning process

**ASSET MAPPING: A GENERAL START FOR ENHANCING EQUITY & INCLUSION**

6

|  |  |  |  |
| --- | --- | --- | --- |
|   | **People/Orgs/Geography** | **Tools/Ed Resources** | **Money/Time/Facilities** |
| **Assets** | **General:** | **General:**  | **General:**  |
|   |
| **Specific:** | **Specific:** | **Specific:** |
| **Opportunities** | **General:**  | **General:**   | **General:**   |
| **Specific:** | **Specific:** | **Specific:** |

**Prompt:** In the top section of each column, indicate general assets and opportunities for advancing undergraduate research to enhance equity and inclusion. Then, identify a specific learning objective for a course, unit, department, or institution and identify assets and opportunities.

**LEARNING OBJECTIVES & SCAFFOLDING**

 7

Cognitive Competencies

Bloom (1956):

* Knowledge –collect and restate information
* Comprehension – interpret and understand
* Application – solve problems
* Analysis – organize and analyze information
* Synthesis – create information from information
* Evaluation – compare and assess information and ideas

Anderson and Krathwohl (2001):

* Remember – recall information
* Understand – make meaning from information
* Apply – use learned material
* Analyze - differentiate among parts of a concept and understand the relationship of parts to one another
* Evaluate – make judgements
* Create – produce/generate new knowledge

*Research is the creation of knowledge.*

Affective Competencies

Krathwohl et al (1964):

* Receiving – being aware of and open to ideas
* Responding – engaging with those ideas
* Valuing – committing to ideas
* Discerning/Organizing – examining those values and placing them in the context of others
* Characterizing – acting in a way consistent with that value

### Sources of UR Scaffolding

 8

###

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Steps of the** **Research Process** | **Learning** **Objective(s)** | **Places**(in curriculum or elsewhere) | **Equitable Places** (in curriculum or elsewhere) | **Forms**(in curriculum or elsewhere) | **Equitable Forms**(in curriculum or elsewhere) |
| * 1. **Explore topics**
 |  |   |  |  |  |
| * 1. **Identify a research question**
 |  |  |  |  |  |
| * 1. **Assess background scholarship**
 |  |  |  |  |  |
| * 1. **Develop a hypothesis or thesis statement**
 |  |  |  |  |  |
| 1. **Identify evidence**
 |  |  |  |  |  |
| 1. **Choose and use a research approach**
 |  |  |  |  |  |
| 1. **Observe and reflect on findings**
 |  |  |  |  |  |
| 1. **Share findings**
 |  |  |  |  |  |

### Crafting a UR Experience

 9

|  |  |  |  |
| --- | --- | --- | --- |
| **Steps of the** **Research Process** | **Learning** **Objective(s)** | **Level and Form of Engagement** | **Level and Form of Equitable & Inclusive Engagement** |
| 1. **Explore topics**
 |  |  |  |
| 1. **Identify a research question**
 |  |  |  |
| 1. **Assess background scholarship**
 |  |  |  |
| 1. **Develop a hypothesis or thesis statement**
 |  |  |  |
| 1. **Identify evidence**
 |  |  |  |
| 1. **Choose and use a research approach**
 |  |  |  |
| 1. **Observe and reflect on findings**
 |  |  |  |
| 1. **Share findings**
 |  |  |  |

**Taxonomy of Undergraduate Research Experiences in Economics**

10

 **[reproduced from DeLoach, Perry, Borg (2012)]**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Course-Based Activities** | **Course-Based Projects** | **Capstone Experiences** | **Collaborative Research** |
| **Goals & Objectives** | Application of course concepts & theories | Integration of course concepts & theoriesClass presentations | Integration of curriculum, economic theory, literature & research methodsAssessment of majors & curriculum Local or regional undergraduatepresentations | Integration of economic theory, literature & research methodsIntroduction to advanced, graduate school-level methods & theoryProfessional presentationsJournal publication |
| **Pre-Requisite Knowledge & Skills** | Skills related to content knowledge | Skills related to content knowledge | Integrated content knowledge Time management Adaptive persistence | Integrated content knowledge Time management Adaptive persistenceTeamworkAttention to detail |
| **Course Level** | All | All | 4th year | 3rd or 4th years |
| **Time Required** | Days, weeks | Weeks, months | Semester, semesters | Summer, semesters |

11

**Taxonomy of Undergraduate Research Experiences in Economics (continued)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Project Intensity & Degree of Student Responsibility**  | Highly structuredStudents make few research decisions Project covers few of steps in research process outlined in Table 1Question often common to all students in the class | StructuredStudents responsible for limited number of research decisions Project covers more, but not all, of steps in research process   | UnstructuredStudents responsible for almost all research decisionsProject covers most if not all steps of the research process  | Varied structure Students jointly responsible for research decisions Project covers all steps of the research process, but students may not be solely responsible for all stepsHigh degree of oversight from faculty |
| **Mentoring Focus** | Individualized or groupMore teaching than mentoring Simple problem-solving-based mentoring | Individualized or group Limited personal, professional developmentComplex problem-solving-based mentoring | Individualized More personal, professional developmentHigh-level problem-solving, roadblocks, ill-structured problems Maintaining focus and forward momentumSome emphasis on professional writing | IndividualizedMost personal and professional developmentSocialization into the profession, including ethics and practiceEmotional ups and downs of researchStrong emphasis on professional writing |

DeLoach, S., E. Perry-Sizemore, and M. Borg. Creating quality undergraduate research programs in economics: How, when, where (and why). *American Economist* 57: 96-110.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **What is your equity-driven learning objective for scaffolding & integrating UR?**  | **How will you determine how effective you have been at achieving or making progress towards this objective?** | **What strategies or activities will you implement to achieve the desired objective?** | **What asset(s) will you engage (or will be bolstered) in achieving or making progress towards your ojective?**  | **How will you know what gains are being made?** | **What is your realistic timeline?** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

 **ASSET-ENHANCED ACTION PLAN MATRIX: PURPOSEFUL DESIGN FOR EQUITY & INCLUSION**

12

**EQUITY TOOLKIT**

13

**APPRECIATIVE INQUIRY**: the act of recognizing the best in people or the world around us; affirming past and present strengths, successes, and potentials; to perceive those things that give life (health, vitality, excellence) to living systems

*Appreciative inquiry unlocks spaces of equity by asking individuals to explore their* strengths, successes, and potentials *and show up to learn as their best selves.*

|  |  |  |
| --- | --- | --- |
| **APPRECIATIVE INQUIRY** | **EXAMPLE** | **MY REFLECTION** ***What do your responses suggest about the conditions you could or should create for enhancing equity & inclusion?*** |
| How do you perceive of yourself as a learner? | * Recall a moment in your own undergraduate educational journey where something felt very foreign and something felt very familiar. What were those experiences? How did they impact you as a learner? What did you do?
* Recall a moment in your own undergraduate journey when your past experiences were affirmed and highly valued. What did that feel like? What did you do? How did it impact your future experience as a learner?
 |  |
| How do your students perceive of themselves as learners? Why? How will you know? | * See example above; ask students to respond to similar questions.
 |  |
| What are your students’ individual strengths or assets (general or related to UR)? | * Examples might include: strategic thinking, relationship building, influencing, executing (see [CliftonStrengths](https://www.gallup.com/cliftonstrengths/en/253715/34-cliftonstrengths-themes.aspx)TM).
* What aspects of their [cultural wealth](https://www.aacu.org/diversitydemocracy/2016/winter/kanagala) do students believe they bring to the learning?
 |  |
| How do you create spaces of equity so that stakeholders have access to what they need to encounter a successful undergraduate research experience?  | * How do you acknowledge and allow for sharing in this learning space?
* How might you transform moments of your meeting times (course/group/staff/board) for individuals to explore who they are becoming or desire to become?
 |  |

**EQUITY TOOLKIT**

14

**AFFECTIVE DOMAIN:** the manner in which we deal with things emotionally, such as feelings, [values](http://www.nwlink.com/~donclark/performance/values.html), appreciation, enthusiasms, [motivations](http://www.nwlink.com/~donclark/leader/leadmot.html), and [attitudes](http://www.nwlink.com/~donclark/performance/attitude.html) [Adapted from Anderson & Krathwohl (2001)]

|  |  |  |
| --- | --- | --- |
| **Domain** | **Examples and Verbs** | **Equity-Minded Questions for Facilitating Affective Learning** |
| **Receiving**: Awareness, willingness to hear, selected attention. | Listens to others with respect. Listens for and remember the name of newly introduced people.**Key Words**: *acknowledge, asks, attentive, courteous, dutiful, follows, gives, listens, understands* |  |
| **Responds to Phenomena**: Active participation on the part of the learners. Attend and react to a particular phenomenon. Learning outcomes may emphasize compliance in responding, willingness to respond, or satisfaction in responding (motivation). | Participates in class discussions. Gives a presentation. Questions new ideals, concepts, models, etc. in order to fully understand them. Know the safety rules and practice them.**Key Words**: *answers, assists, aids, complies, conforms, discusses, greets, helps, labels, performs, presents, tells* |  |
| **Valuing**: The worth or value a person attaches to a particular object, phenomenon, or behavior. This ranges from simple acceptance to the more complex state of commitment. Valuing is based on the internalization of a set of specified values, while clues to these values are expressed in the learner's overt behavior and are often identifiable. | Demonstrates belief in the democratic process. Is sensitive towards individual and cultural differences (value diversity). Shows the ability to solve problems. Proposes a plan to social improvement and follows through with commitment. Informs management on matters that one feels strongly about.**Key Words**: *appreciates, cherish, treasure, demonstrates, initiates, invites, joins, justifies, proposes, respect, shares* |  |
| **Organization** (discerning): Organizes values into priorities by contrasting different values, resolving conflicts between them, and creating a unique value system. The emphasis is on comparing, relating, and synthesizing values.  | Recognizes the need for balance between freedom and responsible behavior. Explains the role of systematic planning in solving problems. Accepts professional ethical standards. Creates a life plan in harmony with abilities, interests, and beliefs. Prioritizes time effectively to meet the needs of the organization, family, and self.**Key Words**: *compares, relates, synthesizes* |  |
| **Internalizes Values** (characterization): Has a value system that controls their behavior. The behavior is pervasive, consistent, predictable, and most important characteristic of the learner. Instructional objectives are concerned with the student's general patterns of adjustment (personal, social, emotional). | Shows self-reliance when working independently. Cooperates in group activities (displays teamwork). Uses an objective approach in problem solving. Displays a professional commitment to ethical practice on a daily basis. Revises judgments and changes behavior in light of new evidence. Values people for what they are, not how they look.**Key Words**: *acts, discriminates, displays, influences, modifies, performs, qualifies, questions, revises, serves, solves, verifies* |  |

**EQUITY TOOLKIT**

15

**COMMUNITY-BASED RESEARCH/SERVICE LEARNING:** an intentional pedagogical strategy to integrate student learning in academic courses with community engagement; emphasizes sharing and reciprocity, partnerships and shared knowledge making defined by mutual respect by partners (University of Colorado Boulder)

****

**EQUITY TOOLKIT**

16

**EQUITY:** access to what individuals need to be successful; the qualities of being fair and impartial; the creation of opportunities for historically underserved populations to have equal access to and participate in educational programs that are capable of closing the achievement gaps in student success and completion (Association of Colleges & Universities)

**EQUITY LENS/LASIK:** *the unceasing practice of and advocacy for employing a value system rooted in social justice* (Richards & Perry-Sizemore, 2020)

|  |
| --- |
| **MODELING EQUITY-MINDEDNESS IN UNDERGRADUATE RESEARCH** |
| Who are your students?Who do they desire to become? |  |
| How will research help your students clarify their values? How do you know? |  |
| *Identify a situation with which you are grappling.* * What kind of information do you need to help?
* What information do you have access to in order to make decisions?
* What tools are you using to inform your decisions?
 |  |
| *Ask students to Identify a situation with which they are grappling and willing to share.** What kind of information will they individually need to assist?
* What information do they individually have access to in order to make decisions?
* What tools are can they individually use to inform decisions?
* How might the research process be similar or different?
* How do you harness the power of the learning collective in assisting with problem-solving?
 |  |

**REFERENCES & RESOURCES**

17

Association of American Colleges & Universities. Making Excellence Inclusive. <https://www.aacu.org/making-excellence-inclusive>. Accessed June 3, 2020.

Anderson, L. W., & Krathwohl, D. R. (Eds.) (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. New York: Longman.

Bauer, K. & Bennett, J. (2003). *Alumni perceptions used to assess undergraduate research experiences.* Journal of Higher Education. 74(2), 210-230.

Bloom, B. S. (1956). *Taxonomy of educational objectives: The classification of educational goals*. New York: Longman.

Bloom, B.S. (Ed.). Engelhart, M.D., Furst, E.J., Hill, W.H., Krathwohl, D.R. (1956). [Taxonomy of Educational Objectives, Handbook I](http://www.amazon.com/Taxonomy-Educational-Objectives-Handbook-Cognitive/dp/0582280109/bigdogsbowlofbis/): The Cognitive Domain. New York: David McKay Co Inc.

Bloom, B. S., Krathwohl, D. R., & Masia, B. B. (1964). *Taxonomy of educational objectives: The classification of educational goals*. New York: Longman.

Cooperrider, D.L. & Whitney, D. (1999). *Appreciative inquiry.* San Francisco: Berret-Koehler.

Crawford, J., Orel, S.E., Shanahan, J.O. (2014)*. How to get started in arts and humanities research with undergraduates.* Council on Undergraduate Research

DeLoach, S., Perry-Sizemore, E., & Borg, M. (2012). *Creating quality undergraduate programs in economics: How, when, where, (and why)*.  The American Economist. 57 (1), 96-110.

Eyler, J. S., Giles, D. E. J., Stenson, C. M., Gray, C. J. (2001). *At a Glance: What We Know About The Effects Of Service Learning On College Students, Faculty, Institutions, and Communities, 1993-2000*. Third Edition (2001)

Hensel, N. H., ed. (2018). *Course-based undergraduate research: educational equity and high-impact practice.* Virginia: Stylus Publishing.

Hunter, A., Laursen, S., & Seymour, E. (2006). *Becoming a scientist: The role of undergraduate research in students' cognitive, personal, and professional development.* Science Education. 91(1), 36-74.

Krathwohl, D.R., Bloom, B.S., Masia, B.B. (1973). [Taxonomy of Educational Objectives, the Classification of Educational Goals. Handbook II: Affective Domain](http://www.amazon.com/Taxonomy-Educational-Objectives-Classification-Goals/dp/B001P4R8Z0/bigdogsbowlofbis/). New York: David McKay Co., Inc.

Kretzman, J. P., & McKnight, J. (2004). *Building communities from the inside out: A path toward finding and mobilizing a community's assets*. Vancouver, B.C: Langara College

Lipmanowicz, H., & McCandless, K. (2016). *The surprising power of liberating structures: Simple rules to unleash a culture of innovation*.

Lopatto, D. (2003, March). *The essential features of undergraduate research*. Council on Undergraduate Research Quarterly(2), 139-142.

Lopatto, D. (2004). *Survey of undergraduate research experiences (SURE): First findings*. Cell Biology Education 3, 270-277.

Lopatto, D. (2006). *Undergraduate research as a catalyst for liberal learning*. Peer Review*:* Winter.

Malachowski, M., Osborn, J.M., Karukstis, K. K., Kinzie, J., & Ambos, E.L (2018). Institutionalizing Undergraduate Research and Scaffolding Undergraduate Research Experiences in the STEM Curriculum. In Gourley, B.L., & Jones, R.M. Best Practices for Supporting and Expanding Undergraduate Research in Chemistry (259-269). **American Chemical Society.**

McNair, T. B., Bensimon, E. M., Malcom-Piquex, L. (2020). *From Equity talk to equity walk. Expanding practitioner knowledge for racial justice in higher education.* New Jersey: Jossey-Bass

National Research Council Committee on the Addendum to National Science Education Standards on Scientific Inquiry, Olsen, R. & S. Loucks-Horsley (Eds). (2000). [Inquiry and the National Science Education Standards: A Guide for Teaching and Learning](http://www.nap.edu/catalog.php?record_id=9596#toc). Washington, D.C.: National Academy Press.

Perry-Sizemore, E. (2018) *Starting a research project.* In J. Rivera and S. Hampton-Reeves (Project Leads) Research as a transferable skill.Epigeum: Oxford University Press. <https://www.epigeum.com/courses/studying/research-as-a-transferable-skill-2/>

Perry-Sizemore, E. *Undergraduate Student Research.* In Starting point: teaching and learning economicsat <http://serc.carleton.edu/econ/index.html>.

Richards, R. and Perry-Sizemore, E. *Introducing Undergraduate Research across the Curriculum* In J. Rivera and S. Hampton-Reeves (Project Leads) Research as a transferable skill.Epigeum: Oxford University Press.

<https://www.epigeum.com/courses/studying/research-as-a-transferable-skill-2/>

Willison, J.M. (2013). Research Skill Development for curriculum design and assessment. Retrieved from [www.adelaide.edu.au/rsd](http://www.adelaide.edu.au/rsd)

What is community-based learning? CU Engage at University of Colorado Boulder. <https://www.colorado.edu/cuengage/about-us/what-community-based-learning>. Accessed Jun 3, 2020.

Transform great potential into greater performance. Gallup CliftonStrengths. <http://www.gallup.com/cliftonstrengths/en/252137/home.aspx> .Accessed July 2020.

**NOTES**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_