

A Scoping Review: Literature on Undergraduate Research and Career Readiness

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Abstract

Undergraduate research, scholarship, and creative inquiry (URSCI) experiences are found to enhance student growth in skill development. Previous research has not established what literature exists on intentionally preparing students for work through URSCI experiences in the United States. A scoping review was conducted to systematically map what the literature reveals that faculty, programs, and institutions are intentionally providing with URSCI experiences. Five databases and Google Scholar were searched. Data were charted by characteristics tied to the research question. The results demonstrated a need for research on URSCI to intentionally and directly assess how undergraduate research can be used as a tool for career readiness. The current reliance on the implicit aspects of the URSCI experience to develop career readiness competencies is not a sufficient approach.

Keywords: *career and workplace readiness, higher education institutes, workforce development*

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In recent years, the national narrative on the value of higher education has shifted. Americans are losing faith in an undergraduate degree and its worth as a vehicle for social mobility and a public good. Gallup poll data from 2015 shows that 57 percent of respondents indicated they had a “great deal” or “quite a lot” of confidence in higher education, compared to 48 percent in 2018 and 36 percent in 2023 (Jones 2024). Employers in the United States also are

losing confidence in the value of a undergraduate degree. The 2021 report, “How College Contributes to Workforce Success,” commissioned by the American Association of Colleges and Universities (AAC&U), shows a decrease in employer confidence in higher education dropping from 49 percent in 2018 to 41 percent in 2020 (Finley 2021). Given these data points, the value of higher education is unclear to a growing group of the public and employers.

With an eye on these trends, in 2019 the Council on Undergraduate Research (CUR) released a white paper, “Undergraduate Research: A Road Map for Meeting Future National Needs and Competing in a World of Change” (Altman et al. 2019) that argued for undergraduate research, scholarship, and creative inquiry (URSCI) experiences as a powerful tool for achieving workforce needs. The authors here use both the more inclusive phrase “undergraduate research, scholarship, and creative inquiry” reflective of the breadth of scholarly and creative activities across disciplines, as well as the more truncated “undergraduate research” more commonly found in the literature. The concise phrase, undergraduate research, is meant to be inclusive of scholarly and creative endeavors as well.

Supporting this position, another data point from the 2021 AAC&U’s *How College Contributes to Workforce Success* report (Finley 2021) shares that 85 percent of employers surveyed were more likely or somewhat more likely to consider hiring a candidate who had a mentored research experience. Considering these documents together begs the question: What elements of the URSCI experience

contribute to workplace readiness and are recognized by prospective employers?

The National Association of Colleges and Employers' (NACE) annual job outlook survey collects information on the skills employers seek in new undergraduates. Using these data, in 2021 NACE updated their list of career readiness competencies that students need to enter and thrive in today's work environment. Eight competencies emerged: critical thinking, teamwork, communication, professionalism, career and self-development, leadership, technology, and equity and inclusion (NACE 2024). These competencies represent demonstrated outcomes of student participation in URSCI experiences. Mekolichick (2021) articulates the alignment in a *NACE Journal* article to assist career center professionals in highlighting the value of undergraduate research (UR) experiences for the workplace. Mekolichick (2023) later elucidates this in the 2023 CUR position paper, "Recognizing Undergraduate Research, Scholarship, and Creative Inquiry as a Career-Readiness Tool," aimed at helping faculty intentionally identify these competencies for themselves and their students.

Specifically, URSCI experiences are found to enhance student learning, including growth in communication skills, critical thinking and teamwork, a greater understanding of the research process, technical skills, and data analysis competencies (see, for example, Brownell and Swaner 2010; Lopatto 2004; Osborn and Karukstis 2009). In addition, the literature consistently reports student improvement in related dispositions and social psychological constructs, including confidence, ability to work independently and overcome obstacles, increases in self-efficacy, cultivation of a professional identity, clarification of career path, leadership, and professionalism (see, for example, Hunter, Laursen, and Seymour 2007; Osborn and Karukstis 2009; Seymour et al. 2004). In sum, research clearly demonstrates the overlap between the benefits of URSCI and the career readiness competencies identified by employers. However, given public sentiment on the ability of higher education to achieve workforce needs, there is a disconnect between the documented career readiness skills gained in URSCI experiences and the translation of these experiences to the world of work.

CUR recognized this gap and charged a board working group (2021–2023) to advance this work. At the conclusion of their work in 2023, an implementation work group on undergraduate research and career readiness was established. As work began, the group recognized a need to learn more about the state of the literature. To date, there has not been a thorough review of the extent to which URSCI experiences have intentionally included career preparation in the United States. Taking into account the value shift regarding higher education and the foundational skills desired by employers described above, a scoping

review was conducted to systematically map what the literature reveals about what faculty, programs, and institutions are intentionally providing to successfully bridge this articulation gap. This scoping review aimed to answer the question: What intentional career readiness competency programming are faculty, programs, and higher education institutions delivering and assessing in undergraduate research, scholarship, and creative inquiry experiences to help students become career ready?

Methods

The protocol was drafted according to the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P; Moher et al. 2015) and was published retrospectively at VTechWorks. The research methodology in this review was based on the JBI methodologies for scoping reviews as described in the *JBI Manual for Evidence Synthesis* (Aromataris and Munn 2020). This article follows the guidance of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR; Tricco et al. 2018).

Eligibility

For inclusion in this review, studies needed to contain at least one NACE competency and an associated assessment of the competency. Publication types included peer-reviewed journal articles, books, book chapters, news articles, white papers, and reports that were housed in the databases or Google Scholar. It is important to note that additional inclusion and exclusion criteria were added at the full-text screening stage. See criteria that begin with "During the full-text screening." Additionally, there were studies excluded during the full-text screening process that conducted assessments of undergraduate research experiences after a program concluded and included a career readiness evaluation but lacked either an intentional career readiness objective or an associated assessment. The aim of this review was not to prove that undergraduate research experiences prepare students to be career ready, but rather to map researched approaches that faculty, programs, and institutions have successfully piloted to bridge the noted articulation gap.

Inclusion criteria included:

- Any undergraduate research program in a higher education context; all two- to four-year accredited institutions, including community colleges and public and private schools
- Undergraduate research, industry-based research, research internships, scholarship, or creative inquiry OR
 - Mention of UR as defined by CUR ("a mentored investigation or creative inquiry conducted by undergraduates that seeks to make a scholarly or artistic contribution to knowledge"; CUR 2024) OR
 - Formal UR experience that is mentored, describing student researchers as receiving one-on-one training,

- research experience, or co-creation of knowledge, scholarship, or creative works
- CUREs (course-based undergraduate research experiences) or capstone courses that align with CUR definition of UR
 - Career readiness as defined by NACE (“a foundation from which to demonstrate requisite core competencies that broadly prepare the college educated for success in the workplace and lifelong career management”; NACE 2024) OR
 - NACE competencies (“career and self-development, communication, critical thinking, equity and inclusion, leadership, professionalism, teamwork, technology”; NACE 2024) OR
 - Industry-based research experience, industry internships with research, employment, professional skills, workplace skills, workplace preparation
 - UR, scholarship, or creative inquiry in any discipline, conducted within the United States. Publications can be published by an outlet (e.g., journal).
 - No date limits.
 - During the full-text screening, the primary goal of the study must include a career readiness intervention regarding one or more NACE competencies (whether explicitly named as NACE or not) with an associated assessment or outcome that is described and designed to measure student mastery of the competency or competencies. Language should state the goal of preparing students for the world of work with a NACE competency—whether explicitly named as NACE or not—that includes an intervention and associated assessment designed to measure student mastery of the NACE competency.

Exclusion criteria included:

- Graduate students of graduate school programs. Middle school or high school students. Except if undergraduate research (etc.) programs or initiatives (as defined in Inclusion) also are included *and* data or descriptions of interest are (or can be) disaggregated.
- Undergraduate courses with research components only (CUREs or capstone courses that align with CUR definition of UR meet inclusion criteria).
- UR programs hosted by companies outside of higher education institutions (e.g., NASA).
- Outside of the 50 United States; territories of the United States are excluded.
- Publication types excluded are conference proceedings, conference abstracts, opinion pieces, editorials, and reports that can only be purchased from associations.
- During the full-text screening, the primary goal of the study does not include a career readiness intervention regarding one or more NACE competencies (whether explicitly named as NACE or not) with an associated assessment or outcome that is described OR the associated assessment or outcome is mentioned but not described. Studies that include surveys or assessments

gathering student feedback on how a UR experience prepared them for their career without a career readiness intervention regarding one or more NACE competencies will be excluded.

Sources

A total of 5 databases were searched in December 2023, and Google Scholar was searched in January 2024. Bibliographic databases were selected to be either non-discipline specific or discipline-specific as related to the research question. An education database was selected to account for interventions taking place in higher education institutions, and a business database was included given the relationship of the outcome with career readiness and the world of work. The following databases were searched:

- Academic Search Complete (1980s–)
- Business Search Complete (1980s–)
- Education Research Complete (1865–)
- Scopus (1800s–)
- Web of Science (1900–)
- Google Scholar (first 204 results)

Search

The search strategy was developed by a librarian on the team, with testing and revisions developed from team discussions. The final search strategy was peer reviewed following the Peer Review of Electronic Search Strategies (PRESS) 2015 Guideline Statement (McGowan et al. 2016) by two librarians outside of this study, both of whom had experience as systematic review coauthors or with evidence synthesis methods. Revisions were made based on their recommendations. The final search strategy used for Scopus was as follows:

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TITLE-ABS-KEY ( ( ( undergrad* ) W/3 ( scholarship OR creativ* OR research* ) ) AND ( nace OR “national association of colleges and employers” OR ( career* OR job OR jobs OR profession* OR work* OR employ* OR occupation* ) W/3 ( readiness OR ready OR development* OR competen* OR skill* OR prepar* ) ) ) )
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All searches were conducted utilizing the title, abstract, and author keywords fields within each database. Filters such as language, publication date, or publication type were not used during the search.

Selection

Covidence was the software tool used for the project (Covidence 2023). To initiate the study, pilot assessments were conducted at the start of each stage of the review process (i.e., title and abstract screening, full-text screening, and data extraction). During the title and abstract screening, 50 studies were reviewed for the pilot by the team, and

conflicts were discussed and resolved before completing the screening for this stage. During the full-text screening pilot, 25 articles were reviewed. The team noted a high rate of conflicts during the full-text screening pilot, discussed the conflicts, and decided to add additional inclusion and exclusion criteria specifically for this round. To resolve the conflicts, the team repeated the full-text screening stage of the pilot with the revised criteria. During the data extraction stage, key characteristics or pieces of information from the studies were extracted in a structured way. Five studies were screened during the pilot by the team, and conflicts were discussed and resolved before completing the extraction phase. For all stages of the review process, two team members screened each study. All conflicts were discussed and resolved by consensus.

Data

Data were extracted on publication characteristics (reference identification number, journal title, study title, lead author, and year of publication), study characteristics (type of institution, aims/purpose, sample size, and discipline of students), career readiness aspect (NACE competency or skill and associated career readiness intervention), and career readiness assessment (how was it assessed, outcomes of the assessment, and any practices or recommendations the authors wished to share).

Synthesis

During the extraction phase, the team chose the method of copying and pasting relevant information into the form directly from the studies. As a result, there were lengthy responses on the form. Some responses were significantly trimmed during the data cleaning and visualization process to make Table 1 easier to read.

Results

Selection

A total of 2518 studies were imported into Covidence. In all, 888 duplicate items were identified by Covidence prior to study selection. Twelve duplicate items were identified and removed manually during the screening processes of the review. The title and abstract screening included 1618 studies, and 1328 studies were excluded. In total, 290 studies were assessed during the full-text screening. The full-text screening excluded 264 studies for the following reasons: 184 did not include a career-readiness intervention with an associated assessment or outcome; 39 were conference proceedings or abstracts, opinion pieces, editorials, or costly reports; 20 took place outside of the United States; 12 were courses with a research paper or project but not a CURE; 6 were research programs for graduate, middle school, or high school students or may have included undergraduate students but data did not differentiate status, and 3 were undergraduate research programs hosted by companies. There were 26 studies remaining that were deemed eligible for this review (see Figure 1).

Characteristics

The data extracted and charted for this review are showcased in Table 1. Each study's lead author, year of publication, journal title, discipline(s) of students, type of institution, NACE competency or skill, career readiness intervention(s), and assessment strategy are displayed. The table has been sorted first by year, newest to oldest, then alphabetically by lead author's last name, and finally by discipline.

Results

For this scoping review 26 articles were identified that met all the inclusion criteria (see Table 1). Figure 2 displays the relevant data charted for each part of the review question and objectives. For example, regarding the "intentional career readiness competency" portion of the research question, the career readiness interview was extracted from each study for data charting (see Figure 2).

Description

Eighteen of the 26 articles identified were published since 2020, suggesting that the focus on career readiness is a recent phenomenon. The primary journals that have published this work are the *Scholarship and Practice of Undergraduate Research* ($n = 5$) and the *Journal of STEM Education* ($n = 2$). The remaining publications were single articles from a variety of journals. Approximately 81 percent of articles focused on traditional STEM disciplines. Nineteen of the studies occurred primarily at four-year public institutions.

Of the 26 studies evaluated, 21 focused on career and self-development, and 13 targeted communication. Professionalism ($n = 6$), teamwork ($n = 5$), and critical thinking ($n = 4$) comprised the next frequency level of competencies addressed. The competencies least addressed were leadership ($n = 1$), technology ($n = 0$), and equity and inclusion ($n = 0$). Interventions implemented for the purpose of developing career competencies were primarily professional or career development workshops and activities ($n = 16$), followed by mentorship ($n = 10$) and skills development ($n = 8$). Unique interventions included conference participation ($n = 4$) and team-based research ($n = 3$). One study used an identity development intervention. When examining assessment methods, surveys ($n = 24$) were the primary mechanism for gathering data. However, a few studies employed focus groups ($n = 4$) and reflective assignments ($n = 3$), with single studies using interviews, assignments, or rubrics.

Discussion

Summary

Of the 26 studies examined, the majority described competency outcomes at large four-year public institutions. Only five represented private institutions with a few (three) partnering with public universities. Only 8 percent of the

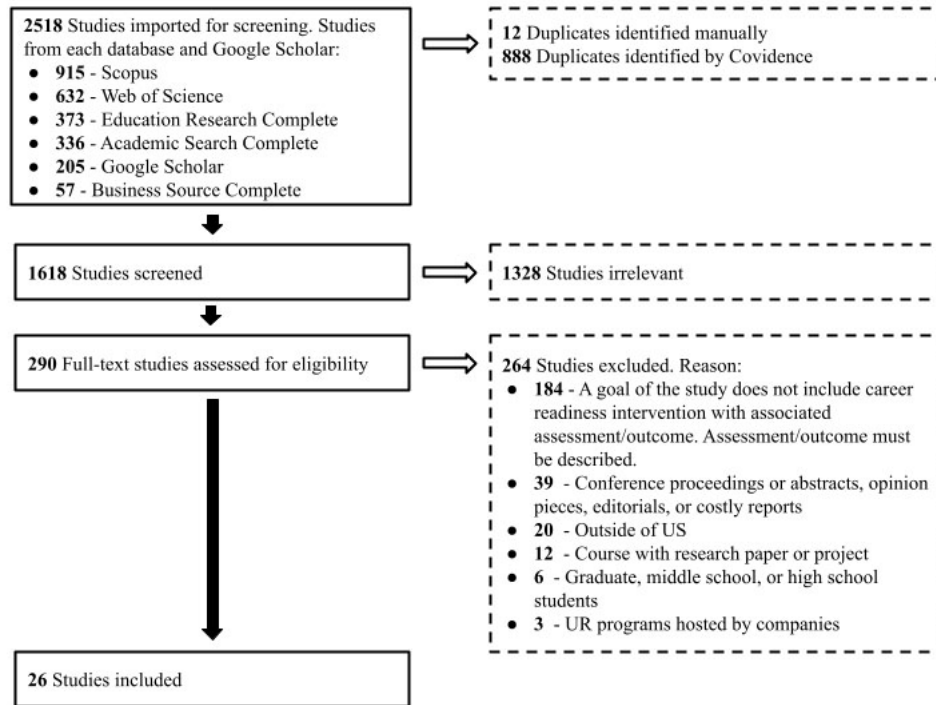
TABLE 1. Synthesis of Results

Lead author	Year	Journal title	Discipline(s) of students	Type of institution	NACE competency or skill	Career readiness intervention(s)	Assessment strategy
Mackiewicz, Marilyn R.	2023	<i>Journal of Chemical Education</i>	Chemistry or biochemistry, biology, engineering, general science, public health	Public; 4 year; multiple collaborators	Career & self-development; communication; critical thinking; leadership; professionalism; teamwork	Professional/career development workshops/activities	Survey
Magana, Alejandra J.	2023	<i>Current Psychology</i>	Statistics	Public; 4 year	Career & self-development	Professional/career development workshops/activities	Pre/post survey
Overbay, Amy	2023	<i>Natural Sciences Education</i>	STEM	Public; 4 year	Career & self-development; communication	Skills development; conference participation	Pre/post survey; focus groups
Posillico, Caitlin	2023	<i>Teaching of Psychology</i>	Psychology	Public; 4 year	Career & self-development; communication; professionalism	Skills development; professional/career development workshops/activities	Pre/post survey
Richard, Jacques C.	2023	<i>Scholarship and Practice of Undergraduate Research</i>	Engineering	Public; 4 year	Career & self-development	Professional/career development workshops/activities	Survey
Roberts, Lindsay R.	2023	<i>International Journal of Aging and Human Development</i>	Geroscience, STEM, and health science	Private; 4 year; minority-serving institution	Career & self-development	Mentorship; professional/career development workshops/activities	Survey
Alm, Cecilia	2022	<i>Journal of Computational Science Education</i>	Computer science	Private; 4 year	Career & self-development	Team-based research; professional/career development workshops/activities	Pre/post survey
Charlevoix, Donna J.	2022	<i>Journal of Geoscience Education</i>	Geosciences	Multiple collaborators	Career & self-development; communication; teamwork	Skills development; conference participation	Survey; focus groups
Hwang, Jihee	2022	<i>Advances in Developing Human Resources</i>	Human resource development and technology management	Public; 4 year	Career & self-development; communication	Skills development	Reflection
Lindsay, Ana C.	2022	<i>Health Promotion Practice</i>	Exercise and health sciences, biology	Public; 4 year	Career & self-development; professionalism	Professional/career development workshops/activities	Reflection
Kistner, Kelly	2021	<i>Scholarship and Practice of Undergraduate Research</i>	Humanities, arts, and social sciences	Public; 4 year	Career & self-development; communication; critical thinking; professionalism	Mentorship; professional/career development workshops/activities	Pre/post survey
Larasatie, Pipiet	2021	<i>Wood and Fiber Science</i>	Wood science and engineering	Public; 4 year	Career & self-development; professionalism	Mentorship	Interviews
Mastroradi, Marialice	2021	<i>Journal of STEM Education</i>	STEM	Public; 4 year	Career & self-development	Mentorship	Pre/post survey

(table continues)

TABLE 1. (cont.)

Lead author	Year	Journal title	Discipline(s) of students	Type of institution	NACE competency or skill	Career readiness intervention(s)	Assessment strategy
Phelps, Marianne	2021	<i>Journal of Medical Education and Curricular Development</i>	Health sciences	Public; 4 year	Communication	Skills development	Survey
Richard, Jacques C.	2021	<i>Scholarship and Practice of Undergraduate Research</i>	Engineering	Public; 4 year	Career & self-development	Professional/career development workshops/activities	Pre/post survey
Dillon, Heather	2020	<i>Scholarship and Practice of Undergraduate Research</i>	Engineering	Private; 4 year	Career & self-development	Professional/career development workshops/activities	Survey
Gueorguieva, Petia	2020	<i>Journal of STEM Education</i>	STEM	Public; 4 year	Career & self-development; communication; teamwork	Mentorship; professional/career development workshops/activities	Pre/post survey; focus groups
McClure-Brenchley, Kimberly J.	2020	<i>Scholarship and Practice of Undergraduate Research</i>	Various	Private; 4 year	Career & self-development; communication; critical thinking; teamwork	Mentorship; professional/career development workshops/activities; conference participation	Survey
McMahon, Tracey R.	2019	<i>Cultural Studies of Science Education</i>	Health sciences	Public; 4 year; multiple collaborators	Career & self-development	Mentoring; identity development	Focus groups
Stumer, Kelly	2017	<i>Problems, Resources, and Issues in Mathematics Undergraduate Studies</i>	Mathematics and biology	Public; 4 year	Communication; teamwork	Mentorship; professional/career development workshops/activities; team-based research	Survey
Fuchs, Jonathan	2016	<i>AIDS Behavior</i>	Public health	Public; 4 year; multiple collaborators	Career & self-development; communication	Team-based research; mentoring	Survey
Marsh, L.E.	2016	<i>North American Colleges and Teachers of Agriculture Journal</i>	Agriculture	Public; 4 year; multiple collaborators; minority-serving institution	Career & self-development; communication; critical thinking; professionalism	Mentorship; skills development	Rubric
Salto, Lorena	2014	<i>PLOS ONE</i>	STEM	Private; 4 year	Career & self-development	Professional/career development workshops/activities; conference participation	Survey
Adedokun, Omolola	2012	<i>Journal of College Science Teaching</i>	STEM	Public; 4 year	Career & self-development	Professional/career development workshops/activities	Reflection
Zier, Karen	2009	<i>Mount Sinai Journal of Medicine</i>	Premedicine	Private; 4 year	Communication; critical thinking	Professional/career development workshops/activities; skills development	Survey
Hirsch, Penny	2005	<i>Journal of Engineering Education</i>	Biomedical engineering, mathematics, computer science, and education	Public; private; 4 year; multiple collaborators	Communication; professionalism	Skills development	Assignment

FIGURE 1. PRISMA Flow Diagram

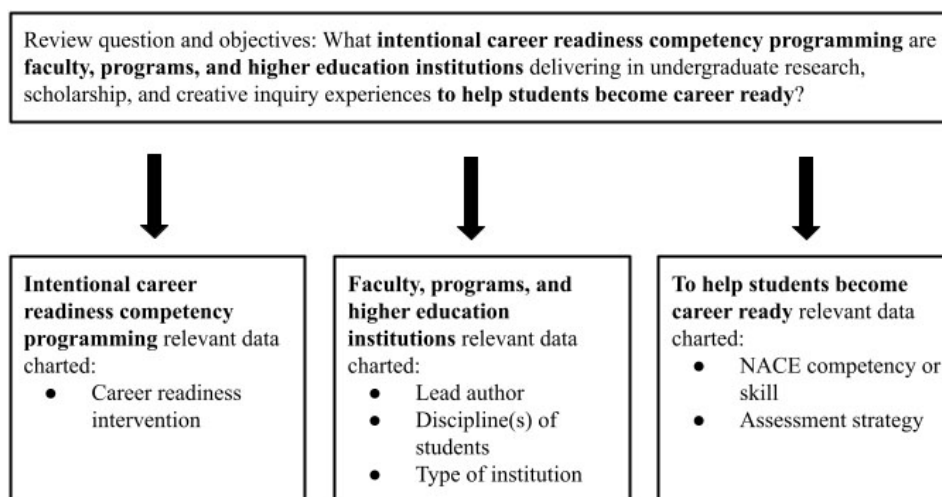
studies identified minority-serving institutions as partners (Marsh et al. 2016; Roberts et al. 2023). Not surprisingly, approximately 85 percent of the studies reported engagement in recognized STEM disciplines, offering large scope for non-STEM disciplines to assess career readiness resulting from research and creative inquiry.

Evidence clearly demonstrates that among the commonly addressed NACE competencies, research programs have focused primarily on developing career and self-development competency ($n = 21$) to help students consider how their research experiences can support their future goals. However, critical competencies such as communication skills ($n = 13$), professionalism ($n = 6$), teamwork ($n = 5$), and critical thinking ($n = 4$) lag significantly.

Although there has been almost no intentional focus on leadership ($n = 1$), technology ($n = 0$), or equity and inclusion ($n = 0$), most of the examined studies measured growth of only one or possibly two competencies. Since development of different competencies may not be mutually exclusive, a more holistic approach may be warranted. It will be important for future studies and interventions to carefully consider how to specifically integrate, build, and evaluate growth of multiple career readiness skills, such as those reported by McClure-Brenchley, Picardo, and Overton-Healy (2020) and Mackiewicz et al. (2023).

The most common interventions involved professional

or career development workshops, seminars, and related activities as supplementary components to the undergraduate research experience. These often took the form of consultations on how to prepare for graduate school or other forms of career exploration (e.g., Magana et al. 2023) and opportunities for students to build their professional networks (e.g., Adedokun et al. 2012). Intentional mentoring for career clarification was ranked as the second-most frequent intervention. The finding regarding mentoring for career development was not surprising, as research indicates that high-quality mentoring results in the greatest gains for both student and mentor (Shanahan et al. 2015; Vandermaas-Peeler, Miller, and Moore 2018). Mekolichick (2023) noted how “mentors can infuse the associated sample behaviors within their undergraduate research, scholarship and creative inquiry projects in visible, transparent, and consumable ways for our students to recognize the relevancy, value and leave with the language and ability to tell their URSCI stories” (1). In addition, the salient practices framework of undergraduate research mentoring (Shanahan et al. 2015) provides a useful scaffolding for mentors as they help build students’ career competencies. This framework identifies practices that align well with NACE competencies. For example, dissemination of research results aligns with communication, and building a community of scholars aligns with teamwork. The third most common interventions targeted skill development, which often focused on building communication skills (e.g., Charlevoix et al.

FIGURE 2. Relevant Data Charted as Sources of Evidence

2022). A unique intervention approach was improvisation workshops (Phelps et al. 2021). Whatever the type of intervention or skill, what was clear from these studies was the need for research programs to collaborate with faculty and staff who have the expertise to build career readiness competencies.

An overwhelming majority of the studies used a self-reporting survey to assess gains in competencies. Often surveys were created for the study or were a modified version of other surveys, including EvaluateUR (Grinberg and Singer 2021), the Undergraduate Research Student Self-Assessment (URSSA; Ethnography and Evaluation Research 2009; Weston and Laursen 2015), and the Survey of Undergraduate Research Experiences (Lopatto 2004, 2009). As noted, a distinct limitation was that these surveys were not designed to assess gains in several NACE competencies. Rather, most focused on research skills that were linked to competencies such as communication, critical thinking, and career and self-development. Two studies used a mixed-methods approach to assessment, and others employed focus groups, interviews, or other reflections or assignments to demonstrate different competencies. The gap in holistic assessment of student career readiness creates a unique opportunity for the design of specific methodologies to assess the roles of UR experiences in advancing the NACE competencies.

Limitations

This scoping review was conducted as part of a Council on Undergraduate Research working group focused on undergraduate research and career readiness. The group concluded that a scoping review would help members better understand the status of career readiness work in UR programs, and where opportunities lie. The research

question, objectives, and decisions made aligned with the timeline required by the group. Some forms of gray literature were excluded by eligibility criteria for types of evidence. These included reports that were not included in databases searched but available for purchase at a high cost on association websites; white papers not indexed in the searched databases or Google Scholar; and all conference proceedings, as some proceedings were only published abstracts and the timeline did not allow for contacting authors for the full-text articles. Reference lists of key studies were not scanned for additional items. Hand searching of websites such as NACE and CUR was not conducted. The data charting form was developed to extract information directly related to the research question and also to inform the group's work in aspects beyond the scope of the research question and objectives. In a future systematic literature review on this topic, researchers should consider crafting broader eligibility criteria and creating a more detailed extraction form to uncover evidence of career readiness competencies that are discussed but not associated with assessments. Use of the NACE competencies and associated assessments is not currently standard in undergraduate research assessment and evaluation practices. Therefore, data charting this type of information was a challenge. At times decisions were made by consensus to exclude articles that appeared to align with the eligibility criteria and potentially valuable to answering the research question, but lacked specificity.

Conclusions

This scoping review demonstrates that there is room to assess and promote the utilization of UR as a tool for career readiness. The recent release of the Mekolichick (2023) position paper should be the impetus for research

projects and associated assessments to employ the NACE competencies to measure growth in the career readiness of undergraduate research students. The 2023 call and findings from this study identify the need for urgent action. More intentional, inclusive pedagogies are required to make more transparent the diverse career readiness competencies derived from UR experiences.

Overall, the findings indicate that there is a strong dependence on the URSCI experience itself as a mechanism to develop and sharpen career readiness competencies, without intentionally identifying and assessing specific elements of the URSCI experience that cultivate career readiness competencies in undergraduate students. The current reliance on the URSCI experience without intentional identification and assessment of workplace competencies in an objective way that documents learning is no longer a sufficient approach to best support student success, particularly given the increasing focus on workforce readiness within and beyond the academy. Design and implementation must entail purposeful alignment of the UR experience with desired competency, performance, and behavior outcomes. To the extent that one measures what one values, this gap in assessment of career readiness competencies gained through the URSCI experience calls attention to the lack of focus on their importance. UR leadership is falling short of demonstrating how the URSCI experience contributes to career readiness.

To better serve undergraduate students, more clearly articulate the value of URSCI, and more visibly support community workforce needs, action is called for. Four steps are presented to get started. First, familiarization with the NACE career readiness competencies; choose one competency as a focus for growth in the next URSCI project. Second, identify one learning outcome associated with a UR experience that aligns with the selected competency and review the sample behaviors. Third, make one change to existing project documents, syllabi, student manuals, assignments, etc., that explicitly names the career readiness competency developed. Refer to articles referenced here or the CUR position paper (Mekolichick 2023) for ideas. Finally, using the NACE sample behaviors as a guide, consider developing student and faculty assessments to identify proficiency (NACE 2024). If one competency is already identified and assessed, consider adding additional competencies and sharing the results publicly. The CUR UR as a Career Readiness Tool work group continues, exploring resources and materials needed to support faculty and institutions. Mentors and higher education leaders advancing URSCI are called on to meet this challenge in service to undergraduate students, higher education institutions, and their communities.

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Data Availability

The protocol and associated data, including search strategies, data extraction form, and data exported following the extraction, are available at VTechWorks (<https://hdl.handle.net/10919/118669>).

Institutional Review Board

IRB was not required for this research.

Conflicts of Interest

The authors have no conflicts of interest to declare.

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