Building Community Through Inclusive, Interdisciplinary, and Cross-Campus Undergraduate Research

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Undergraduate research is a high-impact educational practice that enriches student learning, fosters faculty engagement, and strengthens the academic mission of regional campuses. This paper highlights the development and impact of a distinctive undergraduate research initiative in chemistry and biochemistry at Miami University Regionals. Designed to address disparities in research access between main and regional campuses, the program emphasizes inclusive, interdisciplinary, and cross-campus collaboration. It offers students early and meaningful research experiences through independent study, faculty mentorship, and strategic partnerships while equipping them with essential scientific inquiry and communication skills. The initiative also supports faculty development and contributes to a vibrant scholarly community. Through student testimonials, structural insights, and institutional alignment with best practices, this study underscores the transformative potential of undergraduate research in teaching-focused settings. Future directions include program expansion, institutional recognition, and external funding to sustain and scale its impact across disciplines and campuses.

Introduction

Undergraduate research is a high-impact educational practice that substantially benefits students, faculty, and regional campuses of large universities (Guo et al.; Adebisi). For students, participating in research fosters meaningful mentoring relationships with faculty while enhancing essential skills such as critical thinking, problem-solving, communication, and collaboration. These experiences help clarify academic and career goals, build confidence, and strengthen students' preparation for graduate studies, careers, and workforce entry, particularly in STEM fields. The transferable skills developed through research broadly apply across disciplines, increasing students' competitiveness in academic, professional, and employment arenas (*How Undergraduates Benefit From Doing Research | Best Colleges | U.S. News*).

Through hands-on inquiry, students gain technical expertise, practice data analysis, and collaborate in team settings, skills highly valued in today's workforce and that make students more competitive applicants to professional and graduate schools (Petrella and Jung). Furthermore, opportunities to present at conferences and engage in scholarly dialogue foster professional networking, boost motivation, and enhance a sense of academic belonging. When institutions prioritize equitable access to research, students from diverse backgrounds gain valuable exposure and experience, contributing to a more inclusive and representative academic community. Interdisciplinary collaborations across departments further enrich the educational experience, promoting a dynamic and integrated research culture.

The literature on undergraduate research not only demonstrates positive outcomes associated with these experiences but also suggests that the magnitude of effects varies by outcome domain. Studies consistently report moderate to strong impacts on student persistence in STEM, scientific identity formation, self-efficacy, and clarity of career or graduate school goals, while gains in traditional academic metrics such as course grades or standardized exam performance tend to be more modest or context dependent. These findings indicate that undergraduate research may be particularly effective as a developmental and motivational intervention rather than as a direct substitute for content-focused instructional reforms.

Faculty members likewise benefit from mentoring undergraduate researchers. These collaborations invigorate teaching, support scholarly productivity, and often lead to innovative lines of inquiry. Faculty gain recognition for their mentorship and research contributions while cultivating a more engaged and interactive educational environment. For smaller, teaching-focused regional campuses, supporting undergraduate research strengthens institutional identity, enhances academic reputation, and serves as a powerful tool for student recruitment and retention. It fosters a vibrant intellectual community, attracts external funding, and promotes campus-wide engagement. Ultimately, undergraduate research contributes to a more dynamic, supportive, and enriching educational environment for all members of the academic community.

A cross-sectional survey of medical students at the Michael G. DeGroote School of Medicine in Ontario, Canada, identified key barriers to undergraduate research participation, particularly in an undergraduate

medical program within regional campuses (Jennifer Leigh et al.). Nearly half of the students (44.5%) reported difficulty securing research opportunities, and 43.6% noted the need to conduct research outside their home regional campus. These findings underscore the importance of institutional support to improve research accessibility and integration across campuses.

Undergraduate research is widely recognized as a powerful tool for enhancing student learning, engagement, and professional development, particularly in the sciences. However, research opportunities are often more readily available to students on main campuses in large universities, where most research facilities and core academic programs are concentrated. In contrast, regional campuses affiliated with the main university, which serve smaller student populations through open enrollment in specific geographical areas, typically have more limited access to research resources. The primary mission of regional campuses is focused on teaching in small-class settings, which can further limit opportunities for research engagement. Miami University's main campus in Oxford, OH, houses most of the university's research infrastructure and academic programs. Meanwhile, the university's two regional campuses in Hamilton and Middletown, OH, have traditionally offered fewer research opportunities, creating a gap in access to valuable hands-on learning experiences.

At the same time, undergraduate research is a labor-intensive educational practice, requiring sustained faculty mentorship, individualized project design, and ongoing supervision. This level of investment raises legitimate questions about scalability and cost-effectiveness, particularly at teaching-focused or regional campuses with high instructional loads. Understanding undergraduate research as one component within a broader portfolio of high-impact practices is, therefore, essential when evaluating its role in institutional educational strategy.

Given its labor-intensive nature, undergraduate research is most effective when implemented as a targeted, high-impact intervention rather than a universally applied instructional model. In teaching-focused environments, such initiatives are often designed to serve a limited number of motivated students at key transition points in their academic pathways, thereby maximizing depth of engagement and developmental impact while remaining feasible within existing faculty workload and institutional constraints.

The following section translates these national recommendations and best practices into a concrete, institution-specific implementation at Miami University Regionals

Applications of Best Practices: Undergraduate Research Implementation at Miami University Regionals

Within this context, a distinctive undergraduate research initiative in chemistry and biochemistry was launched in 2022 at Miami University Regionals to address disparities in access and promote a more inclusive, interdisciplinary, and cross-campus research culture. This initiative was intentionally structured to balance educational impact with faculty capacity and student readiness while embodying the transformative potential of undergraduate research highlighted throughout this introduction. By offering hands-on, inquiry-based research opportunities across diverse science disciplines and facilitating collaboration between regional and main campuses, the program fosters critical skill development, professional growth, and sustained faculty–student mentorships, contributing to a more vibrant, engaged, and inclusive academic community across Miami University's campuses.

The Undergraduate Research Model: Independent Study versus Course-Based Undergraduate Research Experiences (CUREs).

Undergraduate research can take many forms, but two of the most common models are Independent Study and Course-Based Undergraduate Research Experiences (CUREs). Each offers unique advantages and poses different challenges, particularly when implemented at smaller institutions like Miami University Regionals.

Independent Study is a flexible, mentorship-driven model where a student collaborates closely with a faculty member outside the traditional classroom setting. These experiences are highly personalized, allowing students to contribute to existing research projects or explore new ideas aligned with their interests. At small campuses, the lower student-to-faculty ratio enables more meaningful one-on-one mentorship. Faculty can devote more time to nurturing student development, making independent study an especially valuable opportunity for upper-level students who have completed key foundational coursework.

In contrast, large campuses often offer a wider variety of research projects and specialized facilities. However, the volume of students and

reliance on graduate students or postdoctoral fellows for mentorship can lead to less individualized faculty-student engagement. Independent study at such institutions may require students to be more proactive and self-directed to navigate the available opportunities.

CUREs, on the other hand, embed research into the structure of a credit-bearing academic course (Duboue ER et al.; Vance-Chalcraft et al.). All students enrolled in the course work on a common research project, often in teams. This model lowers many of the barriers associated with traditional independent study, such as the need to seek out a mentor or possess prior research experience. CUREs are especially effective in broadening access to research, supporting early engagement, and developing scientific thinking across diverse student populations.

CUREs have gained significant traction in recent years. According to a review of 68 articles published between 2016 and 2022 (Field M. Watts and Jon-Marc G. Rodriguez), 82% of CURE implementations in chemistry occurred at doctoral- or master-granting institutions, with only 26% taking place at baccalaureate institutions. Most of these implementations are integrated into upper-level coursework, particularly in biochemistry, with far fewer incorporated into foundational courses like general or organic chemistry laboratories.

At Miami University Regionals, these national trends present both challenges and opportunities. The regional campuses do not offer bachelor's degrees in chemistry or biochemistry. Students in these majors complete their first two years at the regional campuses before transferring to the main campus. However, a bachelor's degree in applied biology is offered at the regionals, which allows biology majors to participate in independent research or CURE-based experiences offered locally. Still, students majoring in chemistry, biology, or pursuing pre-health tracks have limited access to chemistry- or biochemistry-related research opportunities while at the regional campuses, often delaying their involvement in research until they transfer in their junior year.

Implementing CUREs into foundational chemistry courses at the regional campuses could significantly enhance early research exposure for students. However, several barriers must first be addressed. A major challenge is the wide variation in student preparedness in these entry-level courses, with many students struggling in key areas such as math skills, laboratory techniques, time management, maturity, and even clarity in selecting a major. Additionally, standardized course delivery across all

Miami University campuses requires strict coordination and consistency. Any modification to the curriculum, such as the integration of a CURE, requires formal approval and alignment with the Department of Chemistry and Biochemistry at the main campus to ensure uniformity in learning outcomes and academic standards. This makes it difficult to implement CURE-based content exclusively at the regional campuses. Finally, infrastructure limitations further complicate the process, as both the main and regional campuses often face constraints in teaching staff, laboratory space, and budgetary resources.

For these reasons, independent study has become the primary research model for chemistry and biochemistry at Miami University Regionals. This approach allows for greater flexibility in adapting to local resources, student readiness, and mentorship capacity. Faculty can carefully select and train motivated students to work on research projects tailored to the regional campus environment. While this model may not reach as many students as a CURE would, it enables sustained, in-depth experiences that build technical skills, confidence, and long-term mentor-mentee relationships, key components of successful undergraduate research. Compared with CURE or large-scale pedagogical reforms that can reach hundreds of students with relatively low per-student faculty investment, independent undergraduate research reaches fewer participants but offers greater depth, personalization, and continuity of mentorship. While broader strategies may be more efficient for improving aggregate learning outcomes, undergraduate research provides distinctive benefits that are difficult to replicate in classroom-based settings, particularly in fostering scientific identity, confidence, and long-term persistence in STEM.

Balancing Student-Centered and Outcome-Oriented Undergraduate Research

In efforts to define undergraduate research, a key issue identified is whether its primary purpose is student development or outcome production (Beckman and Hensel). When the focus is on fostering student learning, undergraduate research is considered student-centered. In contrast, when the emphasis is on producing tangible outcomes, such as presentations or publishable work, it becomes product-centered. The definition and focus of undergraduate research often vary by department and discipline, reflecting differing expectations. Additionally, a student's academic level may influence the orientation: research for first-year

students is typically more process- and learning-oriented, while senior students may be expected to engage in more outcome-driven projects. The undergraduate research initiative in chemistry and biochemistry described here was launched by a first-year tenure-track faculty member at a regional campus, where faculty are required to produce scholarly work for tenure and promotion. While the program's primary aim was student-centered, in alignment with the regional campus's teaching-focused mission, it also placed intentional emphasis on producing scholarly outcomes, balancing the dual goals of enhancing student development and supporting faculty advancement.

Scaffolding Undergraduate Research: From Recruitment to Readiness

- **Recruitment and Selection Process**

A key mentoring trait highlighted in "*How to Mentor Undergraduate Researchers"* is the mentor's approachability and initiative, especially when fostering collaborative work with students (Merkel). The book notes that many students may feel hesitant to express interest in research opportunities. Aware of their limited experience, they may fear rejection or feel unqualified to contribute to scholarly work. However, in undergraduate research, faculty have the opportunity and responsibility to lead. Mentors can actively recruit students who show a spark of curiosity and enthusiasm in the classroom, even if they haven't yet found the confidence to approach us. By taking the initiative to reach out, mentors can create inclusive and supportive environments that draw out potential in students who might otherwise remain on the sidelines.

At Miami University Regionals, the chemistry mentor uses a structured yet inclusive process to introduce students to undergraduate research opportunities. At the start of each semester, a brief presentation is delivered during the first day of General Chemistry I and II classes, highlighting the research focus, its relevance, and opportunities for student involvement.

Beckman and Hensel (2009) raise an important question: should undergraduate research be available to all students, or should it be reserved for high-achieving or honors students? Given limited institutional resources, some universities choose to invest in a smaller group of students, guiding them toward advanced levels of scholarly development with the expectation of producing tangible outcomes such as presentations or

publications. This selective approach is often intended to prepare students more effectively for graduate school and competitive career pathways. Therefore, later in the semester, an invitation is sent via the course's learning management system, encouraging selected students to attend an informational research session. This session outlines the project objectives, research methods, and campus locations for conducting research, and communicates expectations regarding commitment, skill requirements, and participation standards.

Students who express interest and meet the selection criteria are eligible to begin their research involvement after completing either General Chemistry I or General Chemistry II. The majority of students enrolled in these courses are freshmen, though some sophomores also participate. According to (Merkel), mentors are often hesitant to involve first- or second-year students in research due to their limited coursework and academic maturity. However, an important recommendation in effective mentorship is for mentors to intentionally design sub-projects that are more accessible to early-stage students. These projects should align with the mentor's broader research goals but require less prior knowledge and training. When early engagement is paired with strong mentorship, students are more likely to remain involved in research over multiple years. As a result, they gain deeper experience and become significantly more capable and independent researchers by the time they reach their junior and senior years.

It is important to note that the regional campuses offer a bachelor's degree only in Applied Biology. Students pursuing other science majors, such as Chemistry or Biochemistry, are required to transfer to the main campus after completing their sophomore year. Additionally, some students choose to transfer to the main campus even when their intended degree is available at the regional level. Given these dynamics, it is essential to offer undergraduate research opportunities to science majors at the regional campuses as early as their first year. Because the regional campuses operate under an open enrollment policy, a selection process is necessary to identify and recruit motivated students for research participation. Mentors should intentionally *select students and set clear expectations*. Mentors should look for key qualities in prospective undergraduate researchers, including scientific inquisitiveness, the ability to work independently, and a range of previous experiences (Merkel).

Selection in this chemistry undergraduate research initiative at MU Regionals is based on a combination of strong academic performance, classroom engagement, and personal attributes such as enthusiasm, initiative, and a solid work ethic. In addition, students are expected to demonstrate foundational laboratory skills, the ability to work collaboratively in a team setting, and competence in scientific communication, including report writing. This intentional screening process ensures that participants are not only academically prepared but also equipped with the practical and interpersonal skills necessary to contribute meaningfully to the research experience.

- **Developing Independent Study and Safety Training**

A collaboration was initiated by the chemistry faculty with the Department of Chemistry & Biochemistry at the main campus, the Department of Math and Physical Sciences at the Regionals, and the Registrar's Office to establish independent study courses in chemistry at the Regionals. These courses mirror the independent study offerings at the main campus but carry a regional designation, providing students with a formal pathway to earn academic credit for research. Students are enrolled in an online safety training course provided by the Department of Chemistry and Biochemistry at the main campus, ensuring they complete the required safety protocols before beginning lab work.

- **Research Kick-Off Meeting and Planning**

At the beginning of each research semester, a kick-off meeting is held where students introduce themselves, discuss their schedules, and clarify their roles. The Department Chair is invited to this meeting to reinforce the importance of the initiative and foster a sense of community among the research team.

Research is conducted at both the main and regional campuses. Experiments requiring specialized instrumentation are performed at the main campus, while other aspects are carried out at the regional campus. Students have the flexibility to conduct research at either or both campuses, depending on their interests and logistical needs.

Weekly meetings provide students with ongoing guidance and support, allowing them to review progress, address challenges, and plan

next steps. This structured approach helps students stay focused and fosters a collaborative research environment.

Expanding Opportunities Through Cross-Campus and Interdisciplinary Collaborations

A strong university mission and culture is one of the key best practices that support and sustains highly effective undergraduate research environments (Hensel). Institutions committed to undergraduate research excellence prioritize high-quality research experiences for students, promote broad disciplinary participation, and ensure that opportunities are equitable, accessible to a diverse student population, and aligned with essential career readiness competencies. In addition, research infrastructure that provides appropriate space, equipment, and resources is essential to facilitate meaningful student engagement in research.
A strategic cross-campus collaboration with the Department of Chemistry and Biochemistry at the main campus has significantly enriched the research experience for students at the regional campuses. Through this partnership, regional students gain access to advanced instrumentation and dedicated laboratory space, allowing them to engage in more sophisticated and technically demanding experiments that would otherwise be beyond the scope of regional resources.

In addition to cross-campus cooperation, connections with other STEM faculty at the regional campuses have fostered meaningful interdisciplinary research. One ongoing project, for instance, integrates biochemistry and physics, enabling students to work on complementary aspects of the research. This model promotes collaborative problem-solving, encourages diverse scientific perspectives, and enhances student learning by exposing them to methodologies and concepts beyond their primary discipline.

Moreover, the initiative has attracted participation from main campus students, who now actively contribute to joint research efforts. Their involvement helps create a dynamic academic bridge between campuses, facilitating the exchange of ideas and strengthening both peer and faculty relationships. This interconnected framework not only broadens the scope of scientific inquiry but also cultivates a more cohesive and inclusive research culture across the university.

Impact: Student Development and Showcasing Student Research

Dissemination of research through peer-reviewed publications, presentations at professional meetings, and on-campus symposia is a critical best practice for supporting and sustaining highly effective undergraduate research environments, as highlighted in (Hensel).

The undergraduate research initiative plays a transformative role in student development by equipping participants with essential scientific and professional skills through hands-on training in sample preparation, data collection and analysis, instrumentation, scientific software, manuscript writing, and poster preparation, thereby fostering both technical proficiency and analytical competence that support future academic and professional pursuits.

Beyond laboratory skills, the program emphasizes scientific communication and public engagement. Students have presented their work at prominent venues, including the Annual Undergraduate Research Forum at Miami University and a variety of regional and national conferences. These experiences allow students to share their findings with wider audiences, receive valuable feedback from experts, and build professional networks early in their careers. To remove financial barriers, the regional Dean's Office has committed annual funding to support travel and conference registration costs, making participation accessible to all qualified students.

Since its inception, the program has seen robust student interest and participation. Many students have submitted and presented abstracts at conferences, demonstrating the program's effectiveness in nurturing independent research capabilities, critical thinking, and scientific communication. Students of the program often report increased confidence, improved academic performance, and a clearer sense of direction for graduate studies or careers in STEM fields.

The initiative has advanced institutional goals of equity and inclusion by offering regional campus students research opportunities on par with those at the main campus. The cross-campus nature of the program has fostered stronger student-faculty mentoring relationships and encouraged interdisciplinary collaboration. As a result, the program contributes not only to individual student success but also to a more cohesive, inclusive, and vibrant undergraduate research culture across campuses.

Students' Feedback

Student J.R.

I began undergraduate research during the spring semester of my freshman year at the Miami Regionals. I started by working with Dr. N.N. to study the effects of various cancer drugs on synthetic lipid bilayers. While our research did not yield usable results, the experience deepened my understanding of the research process and taught me that research doesn't always go as planned. Since then, I have worked with Dr. M.B. and Dr. N.N. on carbon nanodot research. These experiences have been extremely valuable, allowing me to develop essential lab skills and gain a deeper understanding of chemistry, biochemistry, physics, and laboratory techniques. These experiences have also allowed me to build important connections with faculty at Miami and fueled my enthusiasm for learning. Furthermore, these experiences have shaped my future career. I have decided to pursue a career in biochemistry, specifically focusing on drug and treatment development in a bio lab. The technical knowledge and experience I've gained have prepared me for success in this field in a way that neither lectures nor labs could. I strongly encourage Miami University to expand research opportunities for students on the Regionals by increasing faculty support, funding, equipment, and lab space. Doing so would not only benefit current students but could also attract more students to the Regionals.

Student E.H.

Over the past year, I have had the wonderful opportunity to work alongside faculty members and participate in undergraduate research through Miami University Regionals. During this time, I have experienced so much growth both as a student and professional as well as growth as a person as I have been challenged both in the lab and outside of it. I have been given opportunities to hone skills such as critical thinking when a procedure in the lab goes awry and doesn't follow the "textbook" version of a lab that might be done in a classroom setting, and I have been given the opportunity to formulate new skills such as operating new equipment and understanding new concepts and analytical information. Having started this research in my freshman year, I have had a unique opportunity to experience and learn in a way that many students have not, which I believe

has set me up for success within the courses I take and concepts that I face as I continue my classes and education.

Having transferred from another university to Miami Regionals, I knew early on that I wanted to participate in research, but I was hesitant as to whether there would be opportunities that suited my interests and qualifications. Upon connecting with Dr. N.N. and having the opportunity to conduct research under her guidance, I have been more and more thankful to have found a place in the lab, especially when there are currently limited undergraduate research opportunities in the biochemistry department for regional students. As I continue down this path with research, I would also urge other students to become involved as more opportunities become available because there is nothing, in my opinion, that better prepares you for classes, a future career, and grad school than research does.

Student P.M.

My research experience at Miami Regionals was truly life-changing, both academically and personally. One of the most impactful aspects was having Dr. N.N. as one of my first professional mentors, her guidance and support helped shape not only my academic journey but also my confidence in myself. I always dreamed of becoming a researcher, but this was the first time I truly felt like I belonged in that world. Being in the lab allowed me to develop critical thinking skills and gave me hands-on experience with techniques that many of my peers hadn't yet encountered. More than that, it gave me a sense of direction and purpose during a time when I really needed it. This experience reminded me that I am capable of achieving great things and helped me realize I am meant for more than what I had once settled for. It inspired me, motivated me, and gave me the confidence to pursue my goals with a new level of determination.

Excellence in Mentoring Undergraduate Research

Excellence in mentoring undergraduate research is a high-impact educational practice. Research studies consistently highlight that faculty mentorship plays a central role in student development, research success, and fostering a positive research environment (Vandermaas-Peeler et al.). Effective mentorship is characterized by several key practices. Faculty mentors should maintain open and consistent communication with their students, provide clear expectations and timely feedback, and offer encouragement throughout the research process. They should guide

students through essential aspects of research, including experimental design, data analysis, literature review, and scientific writing. Importantly, mentors should cultivate a supportive environment by being approachable, encouraging student independence, and recognizing and celebrating student achievements.

To support this vital role, universities should offer structured mentoring programs that include training, resources, and professional development opportunities. Faculty, especially those new to mentoring, often need support to mentor effectively. Institutional investment in mentorship not only enhances student outcomes but also strengthens faculty engagement and research culture.

A Challenge to Effective Mentoring is Faculty Workload

A major barrier to effective undergraduate research mentorship at small, primarily undergraduate institutions is the heavy teaching load faculty often carry, which limits time for meaningful research engagement (Straffin). The short duration of most student-faculty research interactions, usually just one or two semesters, further complicates efforts to mentor students substantially. Integrating research into the curriculum can help address these constraints, as demonstrated by Edinboro University, where short-term, inquiry-based undergraduate research projects have been incorporated into a long-term faculty research program to balance teaching and research productivity.

In a different study, scholars suggest that the most meaningful undergraduate research experiences occur when students are involved in every stage of the research process, from identifying the research question to publicly disseminating their findings, while working closely with faculty mentors in collaborative, supportive relationships (Tugman et al.). This level of engagement requires a high degree of faculty involvement and a strong commitment to mentorship.

At Miami University Regionals, faculty mentorship in undergraduate research is not formally recognized in workload evaluations, making it even more difficult to sustain. Effective mentoring requires time and commitment, including designing projects, supervising students, coordinating across campuses, and often managing the use of specialized instrumentation. Without institutional acknowledgment in the form of workload credit, faculty involvement remains limited, and expansion of the program is hindered.

To strengthen interdisciplinary research and attract more faculty mentors, undergraduate research mentorship must be formally counted as part of faculty workload. This would also support efforts to increase student participation, especially from diverse scientific backgrounds, and enhance cross-campus collaboration. While seeking external funding could provide additional resources, this too presents a challenge, as faculty at regional campuses are primarily teaching-focused and are not typically expected to secure research grants. Addressing these workload-related barriers is critical to sustaining and growing a high-impact undergraduate research culture.

Administration Support and Professional Development to Sustain Undergraduate Research

Drawing on over 30 years of experience from members of the Council on Undergraduate Research (CUR), the Characteristics of Excellence in Undergraduate Research (COEUR) provides a comprehensive framework outlining best practices for initiating, developing, evaluating, and sustaining high-quality undergraduate research programs (Hensel). This framework is organized into sections corresponding to various functions and units within a college or university. It begins with establishing a supportive campus mission and culture where undergraduate research is highly valued and involves commitment from leaders, faculty, and various campus units. Crucially, it requires strong administrative support, encompassing not only internal budgetary resources for materials, personnel, and equipment but also recognition and compensation for faculty through workload credit or reassigned time for research-related tasks and mentoring. A robust research infrastructure is deemed essential, necessitating adequate dedicated space (like labs and meeting rooms), appropriate instrumentation and equipment, and sufficient library resources. To maintain effective scholarship and mentoring, professional development opportunities for faculty (like research leaves and training workshops). Recognizing the importance of contributions, the framework highlights the need for recognition of both faculty and students through avenues like promotion and tenure considerations, salary reviews, campus awards, and prominent publicity for accomplishments.

The Office of Research for Undergraduates at Miami University is committed to supporting and sustaining high-quality undergraduate research programs. Many of the elements outlined in the COEUR framework are already in place at Miami, including access to research infrastructure,

professional development opportunities for faculty, and recognition of research contributions. However, greater attention should be directed toward enhancing undergraduate research opportunities on the Regional campuses, where faculty serve as the primary mentors, unlike the main campus, where undergraduate students often work under the guidance of graduate students or postdoctoral fellows. To ensure equity and effectiveness, increased administrative support is essential, including compensation for faculty through workload credit or reassigned time for research-related tasks and mentoring.

Future Directions and Conclusion

This work does not attempt to quantify effect sizes or directly compare undergraduate research with alternative educational investments such as course redesigns or large-scale active-learning initiatives. Instead, it presents a descriptive and reflective account of a programmatic model situated within a specific institutional context. While student testimonials, participation outcomes, and dissemination activities suggest educational impact, future research employing mixed-methods or longitudinal designs would be valuable for more precisely assessing the relative costs and benefits of undergraduate research within broader institutional strategies. Looking ahead, the undergraduate research initiative at Miami University Regionals aims to expand its reach and impact by becoming more inclusive, interdisciplinary, and cross-campus. Broadening access to students from diverse academic and demographic backgrounds will ensure equity and representation in research participation. Increasing interdisciplinary collaboration with faculty across STEM and non-STEM fields can further enrich the student experience and promote innovation. Strengthening cross-campus partnerships, particularly with the main campus, will facilitate shared resources, joint projects, and a more unified institutional research culture.

For this initiative to grow sustainably, it must be formally recognized and supported. This includes providing faculty with workload credit for mentorship, investing in infrastructure, and integrating undergraduate research into the broader curriculum. Securing external funding will be critical to scaling the program, enabling the purchase of specialized equipment, supporting student travel to conferences, and offering research stipends to promote broader participation.

In conclusion, undergraduate research is a transformative experience that empowers students, enhances faculty engagement, and elevates the academic profile of regional campuses. By continuing to invest in inclusive, interdisciplinary, and cross-campus research opportunities, Miami University Regionals can serve as a model for integrating high-impact practices into teaching-focused institutions and fostering a vibrant scholarly community.

References

Adebisi, Yusuff Adebayo. "Undergraduate Students' Involvement in Research: Values, Benefits, Barriers and Recommendations." *Annals of Medicine and Surgery*, vol. 81, 2022, pp. 104384–104384. *ohiolink-mu.primo.exlibrisgroup.com*, https://doi.org/10.1016/j.amsu.2022.104384.

Beckman, Mary, and Nancy Hensel. *Making Explicit the Implicit: Defining Undergraduate Research*. Council on Undergraduate Research, 2009.

Duboue ER, et al. "Course-Based Undergraduate Research Experiences (CURES) as a Pathway to Diversify Science." *Evolution & Development*, vol. 24, no. 5, Sept. 2022, pp. 127–30. 35971632, *EBSCOhost*, https://doi.org/10.1111/ede.12410.

Field M. Watts and Jon-Marc G. Rodriguez. "A Review of Course-Based Undergraduate Research Experiences in Chemistry." *Journal of Chemical Education*, vol. 100, no. 9, Sept. 2023, pp. 3261–75. Division of Chemical Education, Inc. and ACS Publications Division of the American Chemical Society. 1155 Sixteenth Street NW, Washington, DC 20036. Tel: 800-227-5558; Tel: 202-872-4600; e-mail: eic@jce.acs.org; Web site: http://pubs.acs.org/jchemeduc, *EBSCOhost*, https://doi.org/10.1021/acs.jchemed.3c00570.

Guo, Fenghai 1., et al. *Promoting the Diversity, Equity, and Inclusion in Organic Chemistry Education through Undergraduate Research Experiences at WSSU*. 2021, p. 394. *ProQuest*, https://doi.org/10.3390/educsci11080394.

Hensel, Nancy. *Characteristics of Excellence in Undergraduate Research*. Council on Undergraduate Research.

How Undergraduates Benefit From Doing Research | Best Colleges | U.S. News. https://www.usnews.com/education/best-

colleges/articles/how-undergraduates-benefit-from-doing-research. Accessed 3 July 2025.

Jennifer Leigh, et al. “Motivating Factors of and Perceived Barriers to Research at a Canadian Medical University with Regional Campuses: A Cross-Sectional Survey Study.” *Journal of Regional Medical Campuses*, vol. 4, no. 3, Oct. 2021. *EBSCOhost*, https://doi.org/10.24926/jrmc.v4i3.3934.

Merkel, Carolyn Ash. *How to Mentor Undergraduate Researchers*. Edited by Thomas Q. Sibley and Amy J. Orr, Council on Undergraduate Research, 2010.

Petrella, John, and Alan Jung. “Undergraduate Research: Importance, Benefits, and Challenges.” *International Journal of Exercise Science*, vol. 1, no. 3, 2008, pp. 91–95. *DOI.org (Crossref)*, https://doi.org/10.70252/MXRI7483.

Straffin, Eric C. “Involving Undergraduates in Research; Short Term, Inquiry-Based Projects with Long Term Goals.” *Abstracts with Programs - Geological Society of America*, vol. 36, no. 2, Mar. 2004, pp. 97–97.

Tugman, | Printable Version| Becky, et al. “Capturing the Benefits of Partnering with Undergraduate Student Researchers to Conduct Interdisciplinary Scholarship of Teaching and Learning (SoTL) Research.” *Land-Grant Press | Clemson University, South Carolina*, https://lgpress.clemson.edu/publication/capturing-the-benefits-of-partnering-with-undergraduate-student-researchers-to-conduct-interdisciplinary-scholarship-of-teaching-and-learning-sotl-research/. Accessed 3 July 2025.

Vance-Chalcraft, Heather D., et al. “Bringing Global Ecological Research to Undergraduate Students Through Citizen Science.” *Bulletin of the Ecological Society of America*, vol. 105, no. 3, July 2024, pp. 1–6.

Vandermaas-Peeler, Maureen, et al., editors. *Excellence in Mentoring Undergraduate Research*. Council on Undergraduate Research, 2018.