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UNveiling Undergraduate Research Opportunities For All

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TITLE OF PROJECT

UNveiling Undergraduate Research Opportunities For All

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PROJECT ABSTRACT

VCU is experiencing unprecedented levels of growth in its research operations, having secured more than \$460 million in sponsored research funding in fiscal year 2023 and becoming one of the top 50 public universities in the country for sponsored research. Between FY18 and FY22, sponsored research funding at VCU increased by 49% (Crawford et al 2022). Nonetheless, many faculty members are leaving a key resource untapped: VCU's undergraduate students. According to Dr. Srirama Rao, Vice President of Research and Innovation, in a recent State of the Research address, only about 600 undergraduate students participate in sponsored research annually. Even faculty with significant sponsored research funding often fail to include undergraduates in their research, despite abundant evidence that doing so has the potential to both bolster student success and retention and provide a mentoring experience for the faculty as well as for graduate students. At the same time, VCU's mission to increase student success and retention requires increased support of high impact educational practices (HIEPs) such as undergraduate research. Incorporating undergraduate research into the curriculum will also require significant faculty engagement in curricular planning and teaching.

Common barriers to faculty engagement with undergraduate students reported in the literature include the real or perceived lack of time due to competing commitments such as teaching, service, recruitment, administrative responsibilities, and managing their own research. In addition, faculty often cite a lack of funding and resources as a reason not to engage. Many disciplines outside science, technology, engineering, and math (STEM) do not have formal spaces for conducting research. The humanities and arts, in particular, may struggle to find physical space in which to work with undergraduate students on research outside of the classroom. Furthermore, many faculty believe that the time investment required to teach foundational research skills to undergraduates will not result in a valuable return on investment.

Despite these barriers, research is a significant component of VCU's mission and the focus of multiple ongoing efforts across the University. One of the current priorities of the One VCU Strategic Research plan (as stated by Dr. John Ryan, Associate Vice President for Research Development, in a recent presentation to VCU research administrators) is to increase the engagement of faculty in units where research has been historically hindered due to high teaching loads. Research and Innovation is also a primary theme of Quest 2028, and there are myriad offices and initiatives across the university tasked with promoting research. Among these are VCU's current Quality Enhancement Program (QEP), which aims to develop and advance an undergraduate culture of curiosity by increasing collaborative participation of faculty and second-year undeclared students in research, inquiry, and/or creative expression. These goals align closely with the Team UNity project. In 2022, the Provost's Office organized an external assessment of undergraduate research at VCU, conducted by several experts from other public universities. The review resulted in a detailed report reflecting many of this project's findings. In addition, the REAL initiative, which promotes experiential and integrative learning, as well as reflection and mentorship, encompasses the curricular aims of undergraduate research. Finally, the Undergraduate Research Opportunities Program (UROP), which provides funding to undergraduates and their mentors to conduct research over the course of a summer, serves as a primary source of funding for undergraduate research and can serve as a model for expanded resource opportunities.

QUEST 2028

This project directly supports two of the primary goals of Quest 2028: Student Success, and Research and Innovation.

Student Success: *Ignite student success through curricular innovation* Team UNity's project examines faculty perceptions of and participation in undergraduate research at VCU. As universities nationwide face decreasing enrollment and retention,

offering undergraduates a curriculum and experience that goes beyond the classroom is

essential. As the Quest goal speaks to including all students in transformative learning, a host of strategies will be needed to expand offerings for undergraduate education at the university. Increasing faculty engagement in, and enthusiasm for, undergraduate research will provide students with a more impactful learning experience, supported by mentorship and reflection, and will better equip them to apply these skills throughout their academic and professional lives.

Research and Innovation to address societal challenges: *Innovate together to improve lives and address societal challenges.* Academic research necessarily pushes against the boundaries of societal knowledge. As such, it is inherently innovative and, at its best, promotes social advancement, equity, and prosperity. By offering a means to remove barriers and to encourage faculty participation in undergraduate research efforts, this project seeks to promote a culture of research collaboration and prepare students to impact society through knowledge creation and interdisciplinary research.

PROJECT GOALS

This project aims to answer the question: “How can we increase faculty engagement with undergraduate students in research?” To answer this question, the Team conducted a series of interviews with faculty and other stakeholders across campus, seeking to:

1. Identify real and perceived barriers and benefits for VCU faculty members to engage undergraduate students in their research;
2. Recognize misconceptions among faculty about including undergraduates in their research, and;
3. Create a menu of action items that can be implemented across the university to increase faculty enthusiasm for, and engagement in, the undergraduate research experience.

PROJECT STRATEGIES

The fact that barriers to engaging undergraduates in faculty research exist is evident from past studies on the subject, as well as from the more than 30 interviews our team conducted with VCU faculty and university stakeholders from across the university. Despite these barriers, it is apparent that many faculty members not only engage but are also enthusiastic about the abilities of VCU undergraduates to make real and significant contributions to research. Their enthusiasm calls them to champion the role students play in research. Many relish the opportunity to provide hands-on learning experiences and mentorship to undergraduates. Through a series of semi-structured interviews, the team explored the value proposition for faculty members to engage

undergraduates in their own research, as well as to mentor independent study projects for students.

Semi-structured interviews with faculty and University stakeholders The team conducted interviews with faculty and university stakeholders across campus, including: the Provost, the Associate Vice Provost of Academic Affairs, the Associate Vice Provost for VCU REAL, the Director of Undergraduate Research and Creative Inquiry, and the Interim Director of Center for Teaching and Learning Excellence (CTLE). Based on data provided by the Director of Undergraduate Research and Creative Inquiry, the team identified and interviewed 24 faculty members actively engaged in undergraduate research from a wide range of schools and departments across both campuses. In addition to faculty already engaged in undergraduate research at VCU, the team identified and interviewed a number of faculty who were currently not engaged in undergraduate research to assess the reasons for not engaging.

Each interview consisted of a set of eight questions developed by the team with the intent of invoking meaningful conversations about individual faculty experiences and perceptions surrounding undergraduate research. The questions explored individual faculty experiences with undergraduate students, specific activities that faculty engaged undergraduate students in, perceived benefits of including undergraduate students in their research, barriers encountered while promoting the inclusion of undergraduate students in research (along with strategies that could be employed to mitigate those barriers), differences in enthusiasm between including undergraduates in their own research versus mentoring students conducting independent research projects, and, finally, identifying any misconceptions that their colleagues might have about engaging undergraduate students in research. All interviews were conducted by one or two team members, recorded on Zoom, and transcribed *verbatim*.

A preliminary sentiment analysis of the interviews was performed using ChatGPT. A subsequent analysis of the transcripts was conducted by individual team members to identify overarching themes and subthemes from the interviews. A summary of the findings can be found in Table 1.

Literature and other documents review

In addition to the interviews, the team conducted a literature review of scientific articles pertaining to faculty engagement with undergraduate research with the assistance of Ms. Sabrina El-Shanti, a Doctor of Pharmacy student. In most cases, themes identified from our VCU faculty interviews were also reflected in previous research (Please see Table 2).

Further, the team reviewed QEP documents and an external assessment of VCU's undergraduate research program from 2022, coming away with the understanding both that there is great potential for undergraduate research at VCU to grow, and that the university's leadership is keen to see this happen. In order to scale undergraduate research at VCU, and thereby to provide more of our students with a transformative

learning experience, the team decided to focus on faculty, who are at the frontline of teaching and curriculum.

Contacting peer institutions

Team members reached out to [VCU's aspirational peers](#), as identified by the Provost's office, to investigate how those institutions engage undergraduate students in faculty research. This effort was met with limited success but did lead to conversations with representatives of UCLA and SUNY Buffalo. UCLA reported that faculty were drawn to undergraduate research for the sake of student success and attendant professional satisfaction, and incentivized by fellowship funding as well as administrative and curricular structures, including separate centers for undergraduate research in sciences and in humanities, arts, and social sciences. Promotion incentives varied across the university. Faculty there struggle to find time to incorporate time for mentoring, especially those on the tenure ladder.

The State University of New York at Buffalo offers its students a nationally-recognized Experiential Learning Network (ELN) that is housed centrally, and supports students and faculty across the university. The Network allows students to connect with faculty, find funding opportunities for research, earn digital badges, and connect with organizations outside of the university that share the common interests of the students. This program is currently scaling across the state university system.

QEP meeting attendance

Finally, the team coordinated with the Faculty Development and Implementation Subcommittee of the QEP and attended a number of their meetings. Given that this project will be of direct use to the development of the new quality enhancement plan, the Team worked closely with QEP co-writers, Drs. Herb Hill and Allison Johnson, in developing interview questions (see also: Hill & Johnson 2022). While there were places of divergence—for example: the QEP has moved to focus specifically on undeclared students at the end of their first year and through their second, and this project does not focus on that topic—the broader understanding of barriers for faculty to engage undergraduates in research will continue to support the work of the subcommittee in scaling undergraduate research at VCU.

ACTION STEPS

The following recommendations are based primarily on the findings from the interviews, as well as the literature review, document review, and peer institution contacts.

Redefine “Research” at VCU, so that it encompasses the wide variety of activities in which students engage in creative inquiry. While not a specific finding or

recommendation, the team found a recurring theme in its discussions with faculty: What does VCU consider “Research?” Can curriculum-based assignments qualify as research? Does it have to be externally funded? Does research include mentoring undergraduates in their independent research? Does VCU value faculty mentoring of student research as much as externally funded research awards?

We know that Research is not confined to a laboratory. It happens in the classroom, in libraries, art studios, in the field, on computers and off. It can happen anywhere and involve any academic discipline. The traditional concept of research may exclude the arts and humanities, business, or other disciplines. Research is about inquiry and creating original knowledge, and stakeholders need to embrace the idea that research can be found anywhere. A redefining effort to expand how students and faculty define research would require coordination among the Office of the Vice President for Research and Innovation, the Provost’s Office, and Deans on both campuses of the university to rebrand and promote what research is and emphasize the fact that research is open to everyone at VCU. The QEP has also set out to explore and broaden the definition of research at VCU, and we have engaged the QEP committee in their work on this question.

At the same time, new models developed by pioneering faculty and new initiatives are bridging the gap between research and student learning. Faculty in the Humanities and Arts are beginning “labs” to incorporate student research, often not on specific research questions but on broader topics. In some cases, these labs have been supported by existing structures such as the Vertically Integrated Projects (VIP) program or the Humanities Research Center. Often, such research integrates with coursework or counts for academic credit. Supporting and promoting new models will help faculty reimagine research and the possible role of undergraduates in it.

Review the current promotion and tenure process to recognize mentoring and work with undergraduates on research outside of the classroom. Many faculty members cite the lack of recognition or credit in their annual performance evaluations as a real or perceived barrier for engaging undergraduates in research. Those that make the time to train undergraduates or mentor an independent research project, may not see the value in doing so when that work is not adequately recognized when it comes time for their performance review. Departments should be encouraged to incorporate recognition of

faculty for time spent mentoring independent research, and for engaging undergraduates in their own research activities.

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The team learned, through interviews, that at least one department—Biology—has a process that seems to work for their faculty: faculty receive points on their evaluations for mentoring students (including taking on undergraduates in their labs), which can add up to a credit or course release. While each unit works differently, this, at least, provides

one model to consider.

Offer financial support and recognition for faculty to engage undergraduates in research. This could come in the form of professional development funds or awards (i.e., plaques) to show the value we as a university place on mentorship and on providing our undergraduates with transformative learning experiences through research. Faculty and programs should be afforded funds for teaching assistants, doctoral students, course releases, stipends, support staff, infrastructure such as labs and centers for faculty-student work, and course development for curricular research experiences. (See the budget section below and Table 3.)

Develop course-based research training opportunities for undergraduates to complete by the end of their second year so they have a foundational understanding of what research looks like in various disciplines. Faculty regularly cite the time it takes to train undergraduates on the very basics of research as a barrier to including them. Creating a one-credit course, specific to each department or discipline, would help develop a pool of competent entry-level researchers for faculty to work with.

Create opportunities for faculty to present their research to undergraduates so that students have a better understanding of what specific tasks go into research in their particular discipline. Students in the arts and humanities may not be aware of what research looks like in those areas, since many people picture research as something that is carried out in laboratories or other specialized spaces that may not exist in their disciplines. It may be useful to have monthly research roundtable experiences in the departments, in which undergraduates are invited to hear directly from faculty about the research they are working on. This may inspire students to reach out or faculty to recruit interested students. Additionally, creating dedicated space departments that lack traditional laboratories may be helpful in many disciplines and eliminate the 'space' issue that many non-STEM faculty members identified as an obstacle to engaging undergraduates in research.

Encourage cross-disciplinary research engagement to share lessons learned from other disciplines' practices and form a more deeply-rooted culture of undergraduate research. Promoting collaboration across departments and campuses may lead to

unexpected innovation. Exposure to ongoing cross-disciplinary research initiatives such as the VIPs or iCubed projects also broadens students' exposure to other areas of interest they may not have had an opportunity to experience otherwise. Synergy between research teams across the university can also allow researchers to utilize VCU resources for their initiatives rather than outsourcing and having additional budget constraints.

OUTCOMES

Short-term outcomes based on the project itself:

- Provide aggregated faculty feedback, tools, and information to leaders within Academic Affairs and to the QEP co-writers, including financial considerations for each recommendation.

Long-term outcomes, anticipated if the recommendations are implemented: ● An increased number of faculty who mentor undergraduate students in research ○ Provide curricular and non-curricular models for faculty engagement in undergraduate research.

- An increase in access to High Impact Educational Practices (HIEPs) for VCU undergraduates, which will:
 - Aid in retention efforts at VCU.
 - Increase the number of students who complete REAL Level 4 experiences.

Ultimately, these outcomes should support the general university initiative to make undergraduate research experiences available to all undergraduate students, regardless of major.

SUSTAINABILITY

To ensure the sustainability of the strategies outlined above, it is crucial to integrate the identified transformative shifts aimed at enhancing faculty participation in undergraduate research into VCU's extended financial planning. This integration will ensure the allocation of resources necessary to support the implementation of key strategies.

Additionally, it is imperative to establish courses dedicated to equip undergraduate students with the skills needed to make an early and impactful contribution to their independent research endeavors while also supporting faculty research initiatives. By embedding research skills training into the curriculum, students can become valuable assets to research projects, boosting faculty confidence in their involvement.

Sustainability extends beyond course offerings and financial planning. A cultural shift is essential to ingrain faculty engagement in undergraduate research into the very fabric of VCU. This requires the integration of undergraduate research as a key aspect of VCU's ongoing culture and norms so that it becomes a fundamental part of the university's identity. Leadership and influential faculty members should lead the charge, consistently demonstrating enthusiasm and actively supporting undergraduate research. Their support will be instrumental in gaining the commitment of reluctant faculty and instilling confidence in the potential of undergraduate engagement in research.

The project's sustainability relies on securing the buy-in of key stakeholders. Leadership endorsement and influential faculty support are vital components, ensuring the ongoing vitality of the initiative. Effective communication remains paramount. Continuous, clear, and compelling communication strategies must be established and maintained to sustainably integrate faculty engagement in undergraduate research into VCU's culture. By maintaining consistent communication and providing robust support, undergraduate research will become integral to the university's ethos, fostering a lasting legacy of innovation and mentorship.

FINANCING AND RESOURCES

Project Budget

Together with the VCU Office of Academic Affairs/REAL Division, the project team has identified several budget items and associated cost estimates, as shown in Table 3.

RECOMMENDATIONS

Team UNity hopes that the recommendations outlined above will be further explored by senior leaders, particularly in Academic Affairs and OVPRI, and by the QEP team, to assess feasibility and potentially conduct a pilot project to test some of the proposed action steps. It is recognized that funding is a major issue; however, making such investments now may pay off in the long run through improved student retention and increased enrollments. The cost of not taking action now may result in the stagnation of efforts to boost undergraduate research across the University and prevent VCU from fulfilling its Quest 2028 goals of *igniting student success* and *innovating together*.

FINAL PITCH

Our project presents a transformative opportunity to unlock the latent potential of VCU's research landscape by engaging more undergraduate students in faculty and mentored research. Given VCU's remarkable growth in sponsored research, the university is poised to redefine the boundaries of research engagement. By reviewing the promotion and tenure process, expanding financial support, offering incentives to faculty, providing

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preparatory training to students, and fostering cross-disciplinary collaboration, our vision encompasses a future where barriers are dismantled, misconceptions are dissolved, and a thriving culture of curiosity prevails. Implementation of these strategies may result in tangible outcomes such as: increased faculty mentorship, innovative models, broader access to impactful educational practices, and heightened student retention. Together, we can empower faculty-student partnerships and instill a new era of innovation and mentorship into VCU's legacy.

TEAM PROCESS OBSERVATIONS

Team UNity met weekly on Zoom to coordinate activities and create an action plan for the following week. Agendas were shared via Google Docs, so team members could update them and note any action items for the following week. Individuals who were unable to attend a meeting generally let the group know in advance.

All project documents, interview transcripts, and the report itself were kept in a shared Google drive, allowing team members to make updates or add documents as needed, without having to wait until the next meeting.

Participation among members was generally equitable among a core group, with responsibilities and leadership roles ebbing and flowing throughout the project. Some members had existing personal connections with individuals in key roles at VCU. This was beneficial and helped gain access to certain university stakeholders that may have otherwise not been accessible. We also included some of our broader GEHLI cohort members in our interview process.

TABLES

Table 1. Summary table of findings from interviews with faculty and stakeholders.

Main Theme	Sub-themes Exemplar quotes
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<p>Value Proposition for faculty to include students</p>	<ul style="list-style-type: none"> ● Students bring new perspectives/insights <i>"But now I think actually I've been at it long enough that I can look at those few individuals who are now in their careers are doing this and I'm like maybe the best thing I did was actually</i> ● Undergraduate research students help increase faculty productivity and efficiency <i>mentor that person, maybe that was what it was."</i> ● Undergraduate research students make meaningful contributions and are able to conduct high quality research <i>"...I love hiring the Federal</i> ● Rewarding experience for faculty member to provide mentorship and professional development for students <i>Work-Study students because I care more about giving the money to them than I care about that overall outcomes in terms of the research outcomes..."</i> ● Helps to recruit students and retain them in their program <i>"They're actually much more</i> ● Relationship building with potential future colleagues and collaborators <i>proficient in a variety of tasks than I am anymore. They're much more cutting-edge in</i> ● Promotes diversity and inclusion in research <i>terms of data analysis and stuff than I am. I'm learning from</i> ● Fosters positive culture and community within academic departments and programs <i>them."</i> ● Broadens impact of research through increased dissemination
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<p>Specific activities/tasks for undergraduate research students</p>	<ul style="list-style-type: none"> ● Literature reviews ● Data collection and analysis ● Lab work and conducting experiments ● Crafting research proposals ● Prepare presentations/posters ● Co-author papers ● Attend lab meetings ● Qualitative analysis: transcription and coding ● Receiving training in research methods, critical thinking skills, and the overall research process ● Documenting and photographing research
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	<p>activities</p>
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<p>Barriers to faculty engagement</p>	<ul style="list-style-type: none"> ● Lack of time for mentoring students due to other research, teaching and service responsibilities ● Lack of funding ● Logistical barriers: lack of infrastructure, administrative and management oversight, facilities; lack of centralized resources ● Lack of rewards or recognition ● Lack of awareness for existing programs supporting undergraduate research at VCU ● Limited graduate student availability to assist with undergraduate student mentoring ● Preparation and training of undergraduate students to contribute to the research enterprise ● Undergraduate student's reliability and availability to work ● Perception that undergraduates could slow down their research productivity ● Communication and collaboration issues across disciplines/departments. Lack of sharing best practices. ● Public history is a generally solo profession. Co-written books or work with co-authors/contributors can impact you negatively with P&T <p><i>“You get a project grant, but you get no time.”</i></p> <p><i>“I think a lot of people won't take undergraduates because you don't get any credit for training undergraduates here in the medical campus, in the medical school.”</i></p>
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<p>Misconceptions of other faculty colleagues</p>	<ul style="list-style-type: none"> ● Undergraduate students are not skilled enough. ● Undergraduate students lack motivation/ maturity/ reliability. ● Undergraduate students produce research of low quality. ● Undergraduate research <p><i>“That it will take up a lot of time and that the product that they will get won’t be of the quality that they would like. I feel like that’s probably the most that I’ve heard about. Especially, they’ve had past experiences where they’ve worked with students and it just didn’t help or they had</i></p>
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	<p>cannot advance faculty research.</p> <ul style="list-style-type: none"> ● Processes and requirements are burdensome. ● Undergraduate research is perceived as not rigorous. ● Undergraduate research requires hand holding--too time consuming. <p><i>to redo the whole thing. They’re less likely to work with undergraduate students again. I’ve had some students that haven’t been great on the grad level and I’ve had amazing students on the undergrad. So I’ve had, like, the reverse experience of this.”</i></p>
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<p>Strategies to increase faculty engagement</p>	<ul style="list-style-type: none"> ● Provide funding to undergraduate students and faculty engaged in undergraduate research <p style="margin-left: 20px;"><i>"...our students are very good. They're very creative, they're very smart and capable. It's just how do we create a structure where faculty and students aren't so stressed to just find the time to work together."</i></p> ● Make faculty aware of available programs that help facilitate undergraduate research opportunities (e.g., summer research programs, work-study, or research assistantships) <p style="margin-left: 20px;"><i>"So I think there's vertically integrated projects that's now being launched throughout the school. I think combining teaching load credit with potential for course load credit for students and a mixture of service to the department because some of the work that you'll be doing on that is actually helping to service departments and some of it would be servicing faculty research. So it's a really beautiful way of creating mentorship. By creating a lab, the faculty can have a very broad relationship to how these undergraduates participate in the faculty's larger project."</i></p> ● Provide course release ● Integrate research into curriculum for an early and sustained involvement of students and faculty ● Investing in graduate student funding to increase mentoring capacity ● Recognition of contributions to undergraduate research in faculty annual evaluations and promotion and tenure reviews ● Funding for undergraduate student teaching assistants ● Expand Fellowship Program ● Remove administrative burdens for faculty to
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	<p>include undergraduate students in their research</p> <ul style="list-style-type: none"> • Streamline IRB process for undergraduate work
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Table 2. Literature review findings related to faculty participation in undergraduate research.

Themes	Citations Themes found in our interviews
1. Benefits of undergraduate research	
Undergraduate students bring new perspectives	Potter et al 2009 yes
Undergraduate students increase faculty research productivity	Baker et al 2022, Lei & Chuang 2009 yes
Undergraduate students provide contributions, conduct high-quality research	Shortlidge et al 2016, Potter et al 2009 yes
Professionally rewarding for faculty	Webber et al 2013, Shortlidge et al 2016, Morrison et al 2018, Wayment & Dickson 2008, DeAngelo et al 2015, Potter et al 2009 yes
Helps recruitment and retention of students	DeAngelo et al 2015 yes
Build relationships with potential future colleagues	Shortlidge et al 2016, Zydney et al 2002, Baker et al 2022, Morrison et al 2018, Lei & Chuang 2009, Potter et al 2009 yes
Promote diversity and inclusion in research	DeAngelo et al 2015 yes
Fosters community within academic units	Potter et al 2009 yes
Broadens dissemination of research	Shortlidge et al 2016 yes
Mentoring connects teaching and research	Shortlidge et al 2016, Lei et al 2009 yes
Can contribute to promotion	Shortlidge et al 2016 no
Reaffirm and contribute to institutional goals and student success	Webber et al 2013, DeAngelo et al 2015 no
2. Barriers to undergraduate research	

Lack of faculty time	Webber et al 2013, Shortlidge et al 2016, Zydney et al 2002, Baker et al 2022, Wayment & Dickson 2008, Johnson et al 2015, DeAngelo et al 2015, Potter et al 2009 yes
Lack of training for undergraduate students, faculty need to supply it	Webber et al 2013, Shortlidge et al 2016, Zydney et al 2002, Baker et al 2022, Lei & Chuang 2009 yes
Lack of funding	Webber et al 2013, Shortlidge et al yes

	2016, Wayment & Dickson 2008, Lei & Chuang 2009
Lack of administrative support	Shortlidge et al 2016, Johnson et al 2015 yes
Incorporating Undergraduate student interests into research projects	Shortlidge et al 2016, Lei & Chuang 2009 no
Setting expectations with students	Baker et al 2022, Lei & Chuang 2009 no
No credit for P & T	Johnson et al 2015, DeAngelo et al 2015 yes
Proliferation of PT/adjunct faculty	Johnson et al 2015 no
Proliferation of online/professional programs	Johnson et al 2015 no
Disciplinary barriers; undergraduate research is more common in some disciplines than others.	DeAngelo et al 2015 yes
3. Strategies to increase undergraduate research	
Funding/Financial support	Webber et al 2013, Zydney 2002, Lei & Chuang 2009 yes
Increase awareness of available programs	Lei & Chuang 2009 yes
Provide course release	Potter et al 2009 yes
Integrate research into curriculum	Shortlidge et al 2016, Zydney et al 2002, Baker et al 2022, Lei & Chuang 2009 yes

Invest in graduate student funding	- yes
Recognition of faculty contributions to undergraduate research, especially P&T	Morrison et al 2018, Johnson et al 2015 yes
Provide funding for Undergraduate TAs	- yes
Expand fellowship program	Lei & Chuang 2009 yes
Remove administrative burdens	Webber et al 2013, Zydney et al 2002 yes
Streamline IRB process	- yes
Set up program for faculty development with regard to undergraduate research and/or mentoring	Baker et al 2022, Johnson et al 2015 no

Table 3. Budget Items and Cost Estimates of the Project Implementation.

Budget Item	Cost Estimate	Comments
Hiring Teaching Assistants	\$12-\$14 per hour, or course credit	
Marketing for success stories/symposium/etc	For one time, \$5,000	
Monetary Incentives (likely through UROP program)	For students, \$1500-\$2000 for 144-166 hours on co-curricular research projects (i.e. part-time during the semester). \$5000 for 360 hours on co-curricular research projects (i.e. full-time during the summer). For faculty, \$500-1,000 in professional development funds.	These are "market rates" for undergraduate research stipends and are higher than what we currently offer at VCU. Currently, UROP offers ~50 fellowships per year at the rate of \$ 1,500 per student and \$500 in professional development funds for faculty. Ideally, VCU should fund 150-175 students annually through UROP, which would require \$350,000-400,000, not including the professional development funds.
Department/University level awards	For a ceremonial plaque: \$100-\$175 each	This could also take the form of professional development funds.
Adding undergraduate research to P&T process	No cost	

Course release costs	Faculty buy-out costs vary by school/college.	In CHS, for example, the rate is a percentage of the faculty member's salary (between 10-15%), depending on their course load. For CHS policy, see: https://intranet.chs.vcu.edu/chs-offices/sponsored-programs/resources/guidance-and-procedures/grant-funded-teaching-release/
Training/development for centralized student training in research	TBD	It depends on what this looks like, which could vary by training types dramatically
Training/development for faculty mentoring and undergraduate research	TBD	This could be a project housed in the Office of Undergraduate Research and Creative Inquiry, ideally in collaboration with the CTLE
Increasing funding for graduate students who can mentor undergraduate researchers	Conservatively: \$68,000 per student (including out-of-state tuition, health insurance, and stipend).	Students qualifying for in-state tuition would cost less, and stipends vary by school/college.
More human resource support for undergraduate research year-round	\$65-75k + fringe for 1 FTE if required.	

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