ARTICLE

Increasing Undergraduate Retention in Appalachia through a Mentored Undergraduate Research Experience

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Abstract

This article describes the Research Apprenticeship Program (RAP), a mentored undergraduate research experience implemented in 2017 at a public land-grant institution located in the Appalachian region. The article focuses on RAP's approach to recruiting, retaining, and supporting students in faculty-mentored research and creative inquiry. To assess the impact of RAP on undergraduate retention, institutional data were collected to identify RAP participants from the years 2017 to 2022 (n = 868) to compare next-year retention rates with institutional averages across similar demographic groups. The results showed that retention rates for RAP participants were significantly higher than institutional averages, and disaggregated data also showed higher retention rates for participants from historically marginalized populations. These results provide evidence of the program's contribution to the educational development of the Appalachian region.

Keywords: *first generation, first-year students, one-on-one mentored, retention, underrepresented minority*

doi: 10.18833/spur/7/2/1

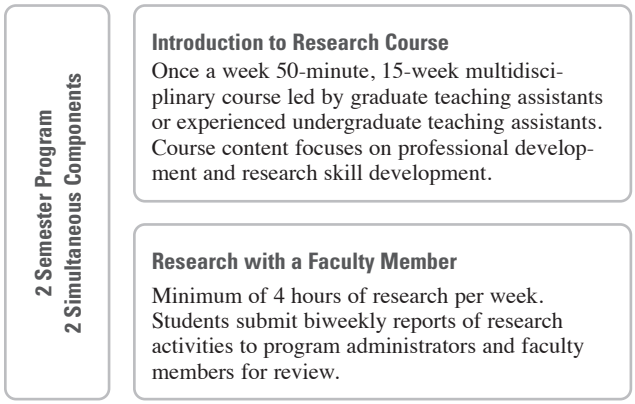
West Virginia, a largely rural state in the Appalachian Mountains, shares the economic distress and educational challenges that have negatively affected the region's population since the decline of coal mining. Like other states in Appalachia, West Virginia falls below national rates of undergraduate persistence and degree completion (SREB 2021) and, as a result, it is likely that the state will face serious challenges meeting workforce needs within the next decade due to a lack of skilled workers capable of managing advancing technology in the workplace. However, studies have shown that undergraduate student participation in high-impact educational practices such as undergraduate research (UR) can have positive impacts on undergraduate retention (Chan, Bhattacharyya, and Meisel 2018; Noble et al. 2007). Underrepresented students such as first-generation undergraduate students, students from low-income backgrounds, and racial minority students benefit most from UR, with previous studies demonstrating that these students experience greater undergraduate success in the form of better retention rates, faster degree completion, and increased pursuit of graduate education as a result of their mentored UR experiences (Chastain et al. 2023; Ishiyama, 2001). Therefore, to better serve its land-grant mission to lead transformation in the state (including advanced education, health care, and prosperity for its population), West Virginia University (WVU) implemented the Research Apprenticeship Program (RAP). Since 2017, RAP has provided first- and second-year undergraduate students with the opportunity to explore faculty-mentored research and creative activities. Due to the large population of first-generation and low-income students in the state, RAP was designed to bridge the achievement gap for students in any discipline by implementing a curriculum and structure that, in many cases, compensates student research efforts with federal funding.

This article presents RAP as a case study to illustrate how UR programming can be utilized to improve persistence, focusing specifically on the approach to recruiting, retaining, and supporting marginalized students in faculty-mentored research and creative inquiry.

Structure

RAP uses a multidisciplinary apprenticeship model that allows students to serve as apprentices for faculty conducting research at WVU. The program lasts two semesters and includes two different components, both of which are required to participate: (1) research activities mentored by a faculty member, and (2) an accompanying course, Introduction to Research, based on the curricular foundation outlined in the work of Branchaw and colleagues (2010) but with more inclusive language added to accommodate students in non-STEM majors (see Figure 1). The first semester curriculum focuses on transitioning participants to undergraduate research by setting expectations for research, providing tools to strengthen their relationship with a mentor, and supporting the development of their researcher identity. The second semester curriculum gives participants the tools to apply for future opportunities and to present their research to a large audience. By the end of the program, all RAP participants present their research or creative work at a university-wide undergraduate research symposium. Ultimately, the accompanying courses provide students with a sense of community and belonging throughout the UR process.

FIGURE 1. Overview of RAP Two-Semester, Two-Component Structure



Recruitment

RAP staff play an active role in pairing students with faculty from WVU. This process involves two major steps: (1) recruitment of faculty interested in hosting a RAP apprentice, and (2) recruitment of student participants.

To recruit faculty each summer, program administrators email a survey to all faculty at WVU. Using the survey, interested faculty indicate their availability to host a RAP apprentice during the academic year and describe the projects available for students. Using survey results, a RAP mentors database containing the cumulative information provided by faculty each year was built. In addition, a training program for mentors that was developed by the RAP director is offered to all UR mentors to better prepare faculty to adopt an inclusive and equitable mentorship approach. All faculty conducting research at WVU are eligible to be RAP mentors.

Student recruitment requires a more active and intentional approach. In addition to advertising the opportunity to all students attending WVU through emails, text messages, and social media, RAP administrators work closely with different offices at the university to actively reach groups that have been historically excluded from research. The WVU Hub (the office overseeing student financial aid) assists RAP in reaching federal work study–eligible students who can use this financial aid to get paid to conduct RAP research, and the Office of Student Success helps RAP reach high-risk students, such as first-generation and rural students, who compose a large population at WVU. RAP staff also actively seek additional ways to pay students to participate in the research experience. In addition to compensating students with federal work study money (~48 percent of participants), other funding sources for RAP research are two smaller National Science Foundation (NSF) initiatives: (1) the INCLUDES First2 Network, which supports approximately 20 first-generation and underrepresented STEM students from WVU each year, and (2) the Louis Stokes Alliance for Minority Participation, which supports approximately six STEM students from underrepresented populations each year. Email messaging caters to various student groups to present RAP as an attractive on-campus job that provides hands-on experience in their field of choice. This active recruitment and compensation structure aims to address systemic barriers that typically exclude certain groups of students from participating in research experiences. Students who are not eligible for funding (~52 percent) are compensated with an additional course credit per semester for their research efforts.

RAP staff, which includes two full-time employees and a half-time graduate student, guide students in their search for mentors based on their academic and professional goals. Once students find projects of interest in the RAP mentors database, the RAP team mediates the first connection between faculty and student, including contacting the faculty, helping to set up a meeting, and helping students prepare their resume and get ready for an interview. This approach has been particularly important for historically marginalized students who may not have experience with research or feel comfortable approaching faculty. After students are matched with a mentor and enroll in the program, the RAP course continues to provide support to students in their transition to WVU and in their connections with their mentor and their research team. There are no selection criteria for students to participate in RAP. All students who secure a mentor can participate. RAP currently enrolls an average of 100 new students each semester.

TABLE 1. Five-Year (Fall to Fall) RAP and WVU Retention

	Total (% of sample)	Students retained	x^2 (p value)
All students			
RAP students	868 (100%)	817 (94%)	213.55
WVU students	36,439 (100%)	26,072 (72%)	(< 0.001)
First-year students			
RAP students	372 (43%)	341 (92%)	30.208
WVU students	23,804 (65%)	19,068 (80%)	(< 0.001)
First-generation students			
RAP students	209 (24%)	189 (90%)	32.58
WVU students	5,251 (14%)	3,797 (72%)	(< 0.001)
Minority students[a]			
RAP students	155 (18%)	145 (94%)	26.5
WVU students	3,805 (10%)	2,861 (75%)	(< 0.001)
Black students			
RAP students	57 (7%)	47 (82%)	2.08
WVU students	879 (2%)	640 (72%)	(0.149)
Low-income students			
RAP students	413 (48%)	375 (91%)	—
WVU students	1,465 (4%)	—	
Rural students[b]			
RAP students	191 (22%)	182 (95%)	—
WVU students	—	—	

Note: Retention rates are reported in aggregate for enrollment between 2017 and 2022. Demographic groups are not mutually exclusive. The university only recently began tracking first-generation students and does not track rural students, so numbers relating to these two populations could not be statistically compared. [a]Minority students include Black/African American, Hispanic, American Indian/Alaska Native, Asian, and Hawaiian Pacific Islander. [b]Rural students are those hailing from rural areas as defined by the Federal Office of Rural Health Policy. RAP, Research Apprenticeship Program; WVU, West Virginia University. χ^2 = chi-squared.

Methods

To assess RAP's impact on retention, institutional data were collected to identify RAP participants from the years 2017 to 2022 (n = 868) to compare with institutional averages across similar demographic groups. Fall-to-fall retention rates were calculated based on enrollment during the next academic year. Pearson's chi-squared test was applied in the R statistical environment (R Foundation n.d.) to determine whether RAP participant retention might be predicted based on overall institutional retention and demographic groups.

Findings

A total of 868 students participated in the program over five years, with approximately 48 percent of participants receiving funding. First-year students represented 43 percent (n = 372) of participants and 92 percent of these students returned to WVU for their second year. When data was disaggregated, the program found greater than expected retention among all RAP participants (n = 868, 94 percent), first-year students (n = 372, 92 percent), first-generation students (n = 209, 90 percent), and minority students as a group (n = 155, 94 percent). Although Black RAP student retention rates were higher than institutional averages, retention was not greater than expected (p = 0.149). Although the institution does not track low-income or rural students, retention rates among participants (n = 413, 91 percent, and n = 191, 95 percent respectively) were greater than institutional averages (72 percent for the past five years; see Table 1).

Discussion and Conclusion

Descriptive statistics from the past five years comparing RAP participants to the general WVU student population indicate that RAP has achieved success in recruiting underrepresented students to the program; the percentages of first-generation students, minority students, Black students, and low-income students that participated in RAP

all exceeded the percentages of these demographic groups attending the university. Additional analyses showed higher retention rates among RAP participants compared to all other WVU students, and these comparisons held true among at-risk groups, including minority and first-generation students. Although higher than institutional averages, retention among Black participants was not statistically significant. This represents a demographic group that requires additional attention from RAP moving forward.

Undergraduate retention remains an important topic in higher education (Rose 2013), and previous studies have shown that UR programming that leverages federal work study funding can enable greater success for students from minority backgrounds (Chastain et al. 2023). However, Appalachian students have been shown to face different obstacles to degree completion than students from other regions. University connectedness, which is an important variable influencing student retention (Hausmann, Schofield, and Woods 2007), plays a key role for Appalachian students, who are reported to have a stronger sense of connection and obligation to their families and communities than their peers from other regions (Wilson et al. 2018). Therefore, initiatives that foster Appalachian students' connections with both their home and university communities are likely important to their persistence in undergraduate institutions. Although further research is needed to ascertain how this emphasis on connectedness may currently impact the retention of Appalachian students, the present study is the first to evaluate the impact of cohort-based undergraduate research engagement on Appalachian students and demonstrates strong impacts on retention across all demographic groups studied. The impact of RAP on the next-year retention of students at a public land-grant institution in the Appalachian region also supports earlier research demonstrating the positive outcomes associated with high-impact practices like UR in other geographic locations (Kuh 2008).

Several strategies used by RAP can be implemented at other institutions interested in supporting historically marginalized student groups and connecting students to the benefits of faculty-mentored UR. Specifically, drawing upon available institutional and external resources such as federal work study and NSF funding to financially support underrepresented student researchers can help make UR more accessible and equitable, and accompanying coursework can support students' successful entry into research and foster belongingness within the UR community. Although this study has shown that more effort is needed to better support Black student researchers at WVU, RAP is otherwise significantly increasing retention rates of underrepresented undergraduates by utilizing these strategies. By meeting its goal of providing more students from Appalachia with the means to participate in UR and reap the benefit of faculty mentorship, RAP continues to serve as an educational intervention that contributes to higher retention rates, with the hope of promoting prosperity in the region.

Data Availability Statement

Raw data are not publicly available. Results came from institutional data and are subject to the Family Educational Rights and Privacy Act guidelines. Analyzed data were made anonymous prior to analysis and can be made available from the corresponding author upon request.

IRB Statement

West Virginia University protocol no. 1906620964. Expiration date: 06/26/2024.

COI Statement

No conflict of interest to declare.

Acknowledgments

The authors would like to acknowledge the support of LSAMP (award number: 1305039) and First2 Network (award numbers: HRD-1834586, HRD-1834595, HRD-1834601, HRD-1834575, HRD-1834569)

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