



Increasing the Participation of Historically Underrepresented Groups in Undergraduate Research using Federal Work-Study

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Undergraduate research is a high-impact practice (Kuh, 2008) defined by the Council on Undergraduate Research as “an inquiry or investigation conducted by an undergraduate student that makes an original intellectual or creative contribution to the discipline” (Council on Undergraduate Research, 2011). This process of scholarly inquiry has proven to have a host of benefits for undergraduate students (Temple, Sibley, & Orr, 2010; Seymour, Hunter, Laursen & Deantoni, 2004). Research experience develops critical thinkers (Hu, Scheuch, Schwartz, Gayles, & Li, 2008), empowers students to become engaged in their own learning (Association of American Colleges & Universities, 2002), improves academic achievement (Ishiyama, 2002) and helps students to explore their chosen educational and career paths (Nagda, Gregerman, Jonides, Hippel, & Lerner, 1998,). Yet, many of the groups who benefit the most from undergraduate research are not engaged in research (Boyd, Wesemann, & Frederick, 2009). This phenomenon is especially problematic, being that early engagement in research improves the retention and academic success of first and second year students (Ishiyama, 2002) and historically underrepresented groups (Gregerman, 2009).

In the recent years, the retention rates for first and second year students have dropped (Heiman, 2010), exacerbating a substantial gap in college completion between historically underrepresented and White students (Sweat, Jones, Han, & Wolfgram, 2013). Historically underrepresented groups, such as Blacks, are disproportionately under-enrolled in four-year colleges and then have substantially lower graduation rates; less than half of minority students graduate within six years (Porter, 1990; Carey, 2008). This variance in persistence to graduation has been attributed to differences in socioeconomic backgrounds, academic preparedness (Tinto, 1993), changes in college aspirations (Hauser & Anderson, 1991), and maladjustment to the college environment (Cabrera, Nora, Terenzini, Pascarella, & Hagedorn, 1999). Given the benefits of undergraduate research, many universities have sought ways to broaden access for all students, including those historically underrepresented (Kuh, Kinzie, Shuch, Whitt & Associates, 2005), in hopes of fostering engagement and thereby improving academic success, retention and graduate rates.

The Office of Student Scholarship, Creative Activities & Research

George Mason University has incorporated student scholarship as one of the three expected features of our undergraduate experience (George Mason University, 2014), and committed to a campus-wide Students as Scholars initiative by developing a Quality Enhancement Plan focused on undergraduate research and creative activities for Southern Association of Colleges and Schools reaccreditation in December 2011 (Usher and Eby, 2011). The Office of Student Scholarship, Creative Activities, and Research (OSCAR) was established as part of this plan in Spring 2012, as the home of the Students as Scholars initiative. The initiative provides opportunities for undergraduate students to participate

in research and creative activities, both within and beyond the classroom. OSCAR supports individual research opportunities, students traveling to report on their research, curricular integration of research projects, and celebrations of undergraduate research (Eby & Usher, 2014). Since December 2011, over 10,000 undergraduates have participated in at least one OSCAR activity, and over 1000 have conducted original scholarly work.

Students as Scholars is committed to the value of the undergraduate research experience for all students. Our internal assessment shows that OSCAR's competitive Undergraduate Research Scholars Program (URSP), which supports high-level independent research and creative projects, funds students who have been prepared through past coursework and direct experience, either at Mason or through other enriching experiences. Our assessment suggested that Mason needed to find creative ways to give students who had, because of their academic and economic backgrounds, few opportunities to prepare for research; students who enter Mason not envisioning themselves as "researchers." Additionally, Mason's National Survey of Student Engagement results show that students who work to pay for college are more likely to have jobs off-campus, and are thus less likely to be engaged in enriching academic experiences (Office of Institutional Assessment, George Mason University, 2010, 2013).

OSCAR Federal Work-Study Research Assistantships

While off-campus employment may negatively impact academic progress and limit faculty-student interactions (Furr & Elling, 2000, Astin, 1993), student engagement in on-campus employment produces higher academic achievement (Hood, Craig, & Ferguson, 1992) and develops career-related skills, (Healy, O'Shea & Crook, 1985). Similar to undergraduate research, on-campus employment has been shown to increase involvement with faculty and open doors for student learning (Furr & Elling, 2000). While Kuh (2008) did not specifically name on-campus employment as a high-impact practice, evidence (Kuh et al., 2005) has shown that student employment also yields benefits that increase student success. One such program that provides opportunities for involvement on campus is Federal Work-Study (FWS).



used to calculate "demonstrated financial need" (Information for Financial Aid Professionals, 2013; Perna, Cooper & Li, 2006). A FWS award can only be earned through an hourly wage position and are traditionally compromised of administrative or secretarial roles on-campus as the program is designed to provide employment opportunities arranged around class schedules (Grants for Federal Work-Study Programs, 2010).

In addition to traditional on-campus employment opportunities, several universities, including Harvard University, Northwestern University, University of Virginia and University of Southern Florida have begun to leverage FWS as a way of multiplying the positive effects of on-campus employment for low-income students through research assistantships. In fact, the University of Michigan and the University of Delaware have shown positive retention and academic achievement outcomes for students participating in undergraduate research for either credit or work-study pay (Greggerman, 1999; Hathaway, Nagda, & Greggerman, 2002; Henry & Washington, 2005). While the opportunity to

use work-study to support undergraduate research is available at several universities, none have created a specific program to recruit, support, and assess a research-focused work-study program. Given the benefits of undergraduate research and on-campus employment, the mission of FWS, and supporting evidence of its success when used for undergraduate research assistants, OSCAR decided to design a FWS program aligned with the mission of the Students as Scholars initiative at Mason.

OSCAR collaborated with the Office of Financial Aid to create the OSCAR Federal Work-Study Research Assistantship (OSCAR RA) program, and piloted the program in Spring 2013. The OSCAR RA program expanded opportunities for economically disadvantaged students to be introduced to the concept of academic scholarship, to learn the research or scholarly methods in their field, and to keep them engaged on campus. This program is intended to be beneficial to both students and faculty. Students are given the opportunity to be involved in the research environment at Mason and gain insight into the process of research while learning skills that make them more successful as students and later as professionals. Faculty are given "free" research assistance (the campus portion of the wages are covered by OSCAR), with the understanding that they provide an enriching educational experience, including involving OSCAR RAs in their research teams and evaluating them each semester.

Research Goals

The purpose of this study was to evaluate whether by targeting economically disadvantaged students, our OSCAR RA program could also increase the number of historically underrepresented groups (female, minority, and first generation students) participating in research at Mason. By assessing what students were learning in their OSCAR RA positions, we expected to find that OSCAR RAs were at least at an emerging level of understanding "how knowledge was generated and disseminated through scholarship, and the importance of scholarship to society," and "articulating a scholarly question, engaging ethically in key elements of the scholarly process, and situating the concepts, practices, or results of scholarship within a broader context." Our expectation was that these students would be at a novice level of "creating an original scholarly or creative project" and "communicating knowledge from an original scholarly or creative project," as these were not stated as goals of the positions (George Mason University, 2013). Finally, we anticipated that participation in the OSCAR RA program would increase student success as measured by their perceptions about how their experience has contributed to their learning as well as retention and graduation.

Methods and Population

George Mason University is a large, public research-intensive university located in the Virginia suburbs, just outside of Washington, DC. In the Fall 2014 semester, Mason enrolled 21,672 undergraduate students, out of 33,723 total students. Mason has a high population of diverse students and is currently and frequently named one of the most diverse universities in the United States by The Princeton Review (Franek, O'Toole & Soto, 2014). Forty-nine percent of the school's students identify themselves as White, with 14% Asian, 9% Black, 10% Hispanic (12% are characterized as other, two or more, or unknown). Similar to other colleges, 54% of Mason's students are female and 46% male. Mason's undergraduate population includes a significant number of transfer students: 63% of students have junior or senior class standing. Despite the location in an affluent region, 57% of Mason students receive financial aid (Office of Institutional Research and Reporting, George Mason University, 2014) and around 27% are eligible for Pell Grants. While the student population has grown by several thousand in the past three years, the proportion of students (by gender, age, financial aid eligibility) has stayed very stable, so comparison data presented in this paper uses Fall 2014 facts.

The OSCAR RA program began as a pilot in the Spring 2013 semester with five students in research

assistant positions. Given the positive response from faculty during our pilot semester, the OSCAR RA program was officially established for the 2013-2014 academic year, with 36 students working with 38 faculty. For the 2014-2015 year, OSCAR again expanded the program, with the potential to hire students into at least 75 positions. As of December 2014 (the end of the data used in this study), 66 students were hired by 67 faculty. Because many students continue in their positions for subsequent semesters, a total of ninety-five unique undergraduate students and 90 faculty mentors have participated in the OSCAR RA Program. The Undergraduate Research Scholars Program has had 202 participants in the same time period.

Data

This study draws on three data sets: Mason Institutional Research & Reporting demographic data, the OSCAR Student Survey, and the OSCAR RA Program Evaluations, completed by students and/or faculty at the end of each academic semester. OSCAR RAs completed the OSCAR Student Survey (Hazel & Usher, 2012) at the end of each semester. The goal of the survey is to track student participation and experiences in undergraduate research and creative activities, and to measure program and student outcomes over time as part of a longitudinal study of student learning. Students also answer a series of program questions (administered through SurveyMonkey) about their experiences and their plans for the future, including their intention to either graduate, continue as an OSCAR RA, seek another FWS position, or not continue with FWS. Faculty mentors are similarly polled at the end of each semester to find out about their interest in continuing in the program and with their OSCAR RA. Mentors also assess their students on the Students as Scholars student learning outcomes, by identifying the student's performance using the Students as Scholars Program Rubric (George Mason University, 2013). These data are used to determine the OSCAR RA placements for the following semesters, as well as to evaluate the program as a whole and make adjustments as needed.

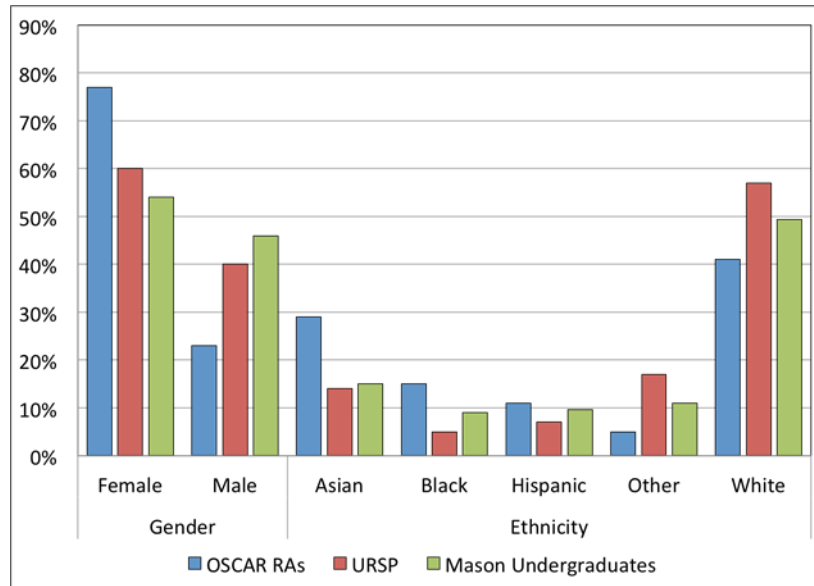
Results and Discussion

Involvement

“More and more students who come from well-off backgrounds have the opportunity to work these unpaid positions and thus have stronger [Curriculum Vitas] than those who have to put themselves through college full-time, WHILE seeking these unpaid opportunities out.” – OSCAR RA Student

The OSCAR RA program is not only offering positions to economically disadvantaged undergraduate students, but is also offering disproportionate opportunities for women, minority, and first generation students at a level higher than both the URSP program and the overall population of Mason undergraduates (Figure 1). This data set is not skewed by student level, as the OSCAR RAs represent a similarly high number of juniors and seniors as the overall undergraduate population. Of the 95 students who have participated in this program, 81 (85%) had never before participated in a research project or creative activity at Mason. Thus, the program meets our expectations that the OSCAR RA program provides experiences to students from historically underrepresented groups who have not otherwise had involvement with research.

Figure 1. Comparison of the rates of participation of unique students in the OSCAR RA program (N=95) and the URSP (N=202) to the general Mason undergraduate population (N=21,672), by gender and ethnicity. OSCAR RA percentages based internal program data from 2 years of implementation. URSP percentages based on internal program data from 3 years of implementation. Mason Undergraduate percentages based Institutional data by Office of Institutional Research and Reporting, George Mason University (2014), as of Fall 2014 student cohort.



Capacity to “Do Research”

“It has been great to see [my OSCAR RA] incorporate knowledge and skills from some of his classes into his work. The most gratifying experience was when it finally clicked for him that objectivity is important, even if you are not getting the results you would want.” –OSCAR RA Faculty

On the whole, students and faculty agree that the OSCAR RA program increases the student's capacity to contribute to research. Qualitative data from the faculty surveys show that while a few faculty have suggested that the program is not suitable for freshmen, most mentors indicate that the students have been valuable members of their research teams, even given their lack of prior experience. One mentor extolled, “My OSCAR RA is fantastic. She's a first semester freshman and is doing better work than some of my Graduate Assistants in the past have...The fact is that she is just beginning and she's showing a lot of promise for being a good student at Mason and being interested in research.” Faculty often volunteered in the comment section of their end-of-semester evaluation that students are “responsible and dependable,” able to work independently and as part of a team, and are significant contributors to their research.

OSCAR RAs perceive their experience in our program as supporting their academic growth. Of the forty unique students responding to OSCAR Student Survey (Fall 2013-Fall 2014), most answered positively (“quite a bit” or “very much”) that the experience contributed to their ability to understand the research or creative process in their field (71%), how research is relevant to what they are learning in their classes (71%) and the difference between personal beliefs and evidence in supporting a position or drawing conclusions (79%). Student comments show that participation in this program has developed a sense of curiosity about the world, encouraged confidence in their abilities, fostered excitement about research, and enhanced the college experience, which is

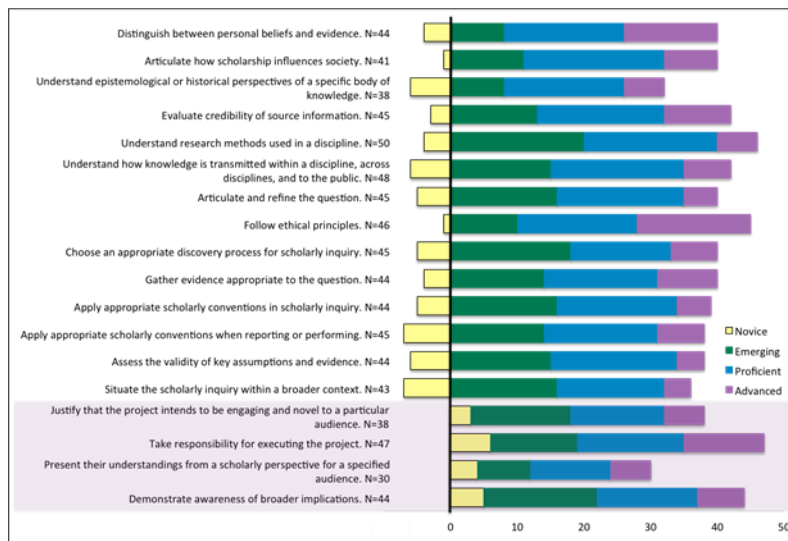
consistent with research on undergraduate research (Temple, Sibley, & Orr, 2010; Seymour, Hunter, Laursen & Deantoni, 2004). The OSCAR RA Program evaluation results challenge obsolete views that undergraduates from underrepresented communities are unable to do research, and instead show that students are able to make significant contributions and that participation contributes to their own growth as scholars.

Learning to “Do Research”

“I think the OSCAR RA program provides a valuable learning experience for work-study students who might otherwise be filing documents or shredding papers. My student is learning, growing, and questioning... all of these are the best I could ask for in an emerging professional.” –OSCAR RA Faculty

As indicated above, participation in the OSCAR RA program has helped students envision themselves as capable of doing research. The student perspectives of their own abilities correlate with faculty assessment of student learning on the Students as Scholars (SaS) Rubric (George Mason University, 2013). The rubric is designed to highlight the learning progress of undergraduate students at Mason as they increasingly engage in research. To assess the impact of the initial OSCAR RA experience, we analyzed the faculty evaluation of the students after the first semester of research, starting in Fall 2014 (Figure 2). These 51 students had been working with their mentor for at least 3 months and up to 8 months at the time of the evaluation.

Figure 2. Faculty evaluation of student competency ((N=51 OSCAR RAs) on the Students as Scholars student learning outcomes, using the SaS Program Rubric. On the un-shaded elements, students are expected to be at least emerging. The OSCAR RA program does not target the shaded elements, so students are only expected to be novices. Note that the individual numbers on each element do not always add to 51, as faculty also had the opportunity to choose “not applicable” for elements that were not addressed as part of their OSCAR RA’s experience.



Assessments suggest that more than 84% of OSCAR RAs meet or exceed program goals, in relationship to the our lower levels of engagement. The highest levels of competence are found in the outcomes related to the active participation in research (e.g. understanding research methods, choosing appropriate processes, or gathering evidence), while lower levels are found in outcomes related to contextualizing research (e.g. understanding epistemological or historical perspectives, applying appropriate scholarly conventions). Faculty were very confident about their students’ abilities to “follow ethical principles,” a welcome finding! The most unexpected outcome is that 60%

of students are rated by their mentors as being able to “take responsibility for executing a project” at a proficient level normally associated with high-level independent research, and full 87% were considered at least emerging. This finding suggests that although aimed at lower levels of engagement, economically disadvantaged and historically underrepresented students are able to understand the scholarly process and make significant contributions to research, sometimes at the highest level of engagement.

Mentoring Relationships

“My mentoring relationship can be described as well-rounded. My mentor taught me a lot of new things about research and also welcomed the input of each research assistant, ensuing that we worked in a space where that was a constant exchange of ideas.” - OSCAR RA Student

The positions offered through the OSCAR RA program, offer both faculty and students the opportunity to engage in new mentor/mentee relationships. Assessment of our students show that receiving compensation was a motivating factor to apply for OSCAR RA positions, as would be expected. However, students were motivated by many factors, and no factor was rated as low (Table 1). Assessment of faculty at Mason show that new faculty, term instructors, and non-STEM faculty did not have the support for their research, especially for pilot projects (Hazel & Usher, 2014), so it is reasonable to suggest that the appeal of “free research assistance” was a motivating factor for faculty to first enlist an OSCAR RA. The ability of our program to make connections between faculty and students has been successful; 78% of students (31/40) and 81% faculty (50/62) who responded to the survey indicated wanting to continue with their partnership from one semester to the next.

Table 1. Students' responses to the question about what factors motivate them to participate in the OSCAR RA program from the OSCAR Student Survey. Students were asked to check all that apply. Responses are grouped by highest, and moderate motivating factors. No factor was in the lowest category (less than 25% would be motivated by this factor).

Moderate 25%-74%	High (>75%)
Meeting other students who have similar interests of goals	Being excited by or loving the work
Working on a project that might contribute to individual or community well-being	Gaining experience for career or graduate school
Being required by my academic major or program	Receiving compensation or pay
Earning RS [Research & Scholarship Intensive] designation on my Mason transcript	Working on a specific project of interest
	Working with a specific faculty member

Time Management

“In a perfect world, I would have had more time to advance her involvement in my project, but it was my first year at GMU and I was not as organized as I would have wished to be.” - OSCAR RA Faculty

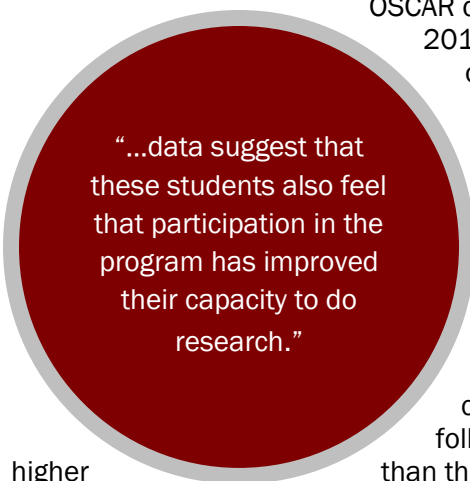
Students often underestimate the time commitment required by their classes and the workload associated with their research while simultaneously being overwhelmed by the transition to college

(Pita, Ramirez, Joacin, Prentice & Clarke, 2013). For many students participating in the OSCAR RA program, this is both their first work and research experience. As Federal-Work Study positions are wage employment, and students are expected to work about 10 hours a week. While working through college provides financial benefits to economically disadvantaged students (Curtis & Shani, 2002), for those with or without prior work experience, time management can be an issue. In fact, OSCAR RAs have cited the difficulty in finding a balance between work and school as either a learning opportunity or a reason for leaving a position. Time management issues are not unique to students; as faculty also indicated that they found it hard to interrupt their research progress to fully involve students in the research process. In some rare cases, time management has been cited as the reason for termination of the position. However, most students and faculty who mention time management have moved on to develop positive mentoring relationships.

Responding to this feedback, OSCAR instituted an orientation for students and mentors each semester, beginning in Spring 2014, and has increasingly stressed time management. New mentors are given the Council on Undergraduate Research's How to Mentor Undergraduate Researchers handbook (Temple, Sibley & Orr, 2010). Starting in Spring 2015, students will also be encouraged to attend an additional time management workshop offered by Mason's University Life.

Persistence

"I will be a competitive enough candidate for graduate school when I apply next fall. A lot of my progression really is because of the OSCAR RA Program." - OSCAR RA Student



OSCAR data indicates that of the 42 students in Spring 2013-Spring 2014, 21 OSCAR RAs (50%) have continued in their position for two or more semesters and/or persisted through to graduation. Reasons for not continuing include situations where the student is no longer economically eligible for FWS, the project has ended, the faculty member is not present on campus, or the student has not made sufficient progress. Even those students who have been terminated from one OSCAR RA program have indicated the value of the experience, reapplied for other research positions and/or continued enrollment at Mason. Overall, the program has a 97% combined retention/graduation rate (students who either continued enrollment at Mason or graduated the semester following their research assistantship, N=107 instances), which is higher than the highest retention rate (88%) associated with any student cohort at Mason (Office of Institutional Research and Reporting, George Mason University, 2014). Therefore, even if students do not continue in their OSCAR RA position, they are academically engaged at Mason and succeeding at a very high rate.

Conclusion

"I believe that the OSCAR RA program has helped create an environment where students and mentors simultaneously learn from each other, which fosters a culture of student scholarship." – OSCAR RA Student

The OSCAR Federal Work-Study Research Assistantship Program (OSCAR RA) began in Spring 2013 with the expectation that it would offer targeted opportunities to economically disadvantaged students who normally did not participate in research at Mason or see themselves capable of doing

research. This was an opportunity to determine if we offered opportunities to undergraduate students who “demonstrated financial need,” would we be able to increase the number of historically underrepresented students participating in research at Mason. While not specifically designed to do so, the data show that targeting economically disadvantaged undergraduate students has offered disproportionate opportunities to females, minorities, and first generation students. Additionally, data suggest that these students also feel that participation in the program has improved their capacity to do research. Faculty assessments of these students indicate that they are learning at levels that exceed program goals. While the reason for participating in the OSCAR RA program vary by student, students and faculty have indicated that they have experienced positive mentoring relationships and would like to continue in the program. Given the lack of student work and research experience and faculty hectic schedules, time management issues have arisen but most can be worked through to create a positive experience in the program. The OSCAR RA program is also retaining these students over multiple semesters or through graduation. Given the success of this program in reaching both economically disadvantaged and historically underrepresented groups, OSCAR plans to continue offering the OSCAR RA program and increase the number of positions offered to students in the upcoming academic year.

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