PURM
Perspectives on Undergraduate Research and Mentoring

Seeing the Unseen: Lessons from a Case Study on Mentoring Underrepresented Students in Research

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Two demographic trends suggest changes may be needed in institutional procedures and faculty members' practices related to mentoring undergraduate researchers. First, 'minority' students will soon be in the 'majority' in the United States. By 2060, the Census Bureau projects that the non-Hispanic white population will only make up 44 percent of the U.S. population under 18 and that one in five U.S. residents will be foreign born (Colby & Ortman, 2015). Further, no one race or ethnicity will make up a majority of the population and an increasing number of people will report being of mixed race or ethnicity (U.S. Census Bureau, 2015a). In the U.S. state of Arizona, students enrolled colleges and universities that identify as Hispanic or Latino already make up over 30 percent of the population (U.S. Census Bureau, 2015b).

Second, the enrollment of non-traditional students has increased, almost doubling in some cases. Non-traditional students are those students who take alternative pathways to college rather than enrolling directly out of high school. For example, students over the age of 25 increased by 41% from 2000-2011 in U.S. institutions of higher learning (U.S. Department of Education, NCES, 2015b). Further, one third of U.S. undergraduate students transferred from one institution to another at least once in their first five years of attending college (Hossler et al, 2012). There is a growing recognition that the 'traditional' 18-22 year old college student no longer characterizes who attends post-secondary education (Lunsford, 2003).

Yet, minority students are still underrepresented among doctoral programs (Summers & Hrabowski, 2006). Less than 12% of doctorate degrees are conferred to African American (6.6%), Hispanic (4.7%), and American Indian/Alaska Native (0.7%) students (U.S. Department of Education, NCES, 2015b). Jones, Barlow and Villarejo (2010) argue for a need to provide more research opportunities to prepare minority students for the rigorous and competitive process of application to graduate programs. We were unable to even locate statistics on the number of transfer students who enroll in graduate programs.

Despite the projected dramatic shifts in the resident population it is unlikely the professoriate will change as quickly or as dramatically. Not only are high school teachers (Wang & Odell, 2002; Lunsford & Ochoa, 2014) overwhelmingly non-Hispanic and white but so are faculty members (U.S. Department of Education, NCES, 2015a). The extensive level of training required for these positions makes it likely that changes in the demographics of the academe will be slow. In the fall of 2013, the majority of the full time faculty members (79%) in post secondary institutions were white (U.S.

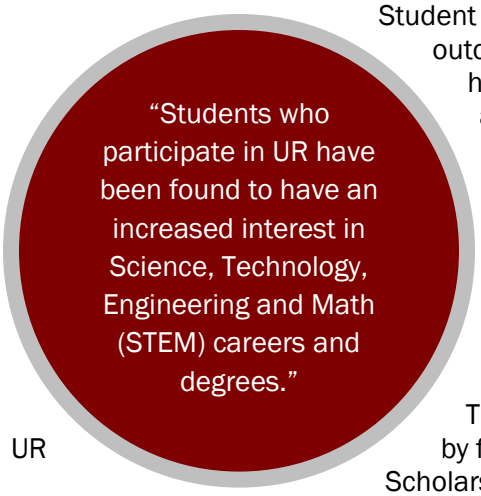
Department of Education, NCES, 2015a). Thus, most faculty members are increasingly faced with a student body from an ethnic background that is different from their own.

We assert that there is both a need and an opportunity to create more inclusive practices to engage undergraduates from different ethnic and non-traditional backgrounds in the research enterprise. In this paper we first highlight the benefits of participation in UR for minority and non-traditional students. We then present a biographical, multiple-perspective, narrative analysis of underrepresented students in research. The three student authors were transfer students, two are minority students, two are working students, and one is a returning student. This paper will reflect on experiences from two underrepresented student groups: non-traditional students and Hispanic students. For this paper the term non-traditional includes students who work during school, who transferred to a four-year school, or who are older than the traditional 18-22 year old college student. Finally, we draw on both a student and professor perspective to share lessons learned that may be of use to faculty members and university administrators who support undergraduate research.

Literature Review

There is evidence that good faculty mentoring is responsible for the benefits students experience in undergraduate research (UR). This section first presents a summary about the benefits of UR, followed by what is known about transfer students and UR. We then draw on the literature on student belonging to describe how UR experiences may contribute to a greater sense of belonging for underrepresented students.

Benefits of Undergraduate Research



Student participation in UR has been associated with positive outcomes. Students who participate in UR have been found to have an increased interest in Science, Technology, Engineering and Math (STEM) careers and degrees (Russell, Hancock, & McCullough, 2007). Other scholars have reported that students who participated in UR experienced learning and personal gains, which contributed to their academic success (Lopatto, 2007; Russell, Hancock, & McCullough, 2007). Positive increases in cognitive and intellectual development (Hunter, Laursen & Seymour, 2007) have also been found in students who engage in UR.

The National Science Foundation (NSF) has been a supporter of UR by funding summer Research Experiences for Undergraduates. Scholars studied underrepresented undergraduates who participated one of these programs (Russell, Hancock, and McCullough, 2007). They found that students who participated in UR benefited more than students (in a control group) who did not. Most (88 percent) of the students reported that their understanding of conducting a research project increased, research skills increased (83 percent) and they became more aware of graduate school opportunities (73 percent) (Russell, Hancock, & McCullough, 2007).

Summer's and Hrabowski (2006) studied UR in biology and found that participation in UR at any point during a students' undergraduate career was associated with increased odds of students staying in a STEM field. These scholars note the odds of students graduating in biology are three-and-a-half to five times greater for students who engaged in UR compared to non-participants (Summers & Hrabowski, 2006).

An Internet search with the key words of undergraduate research reveals a proliferation of programs

to support minority students in summer research activities. A few examples of such programs are The University of Pennsylvania Summer Undergraduate Minority Research Program (http://ldi.upenn.edu/sumr), Johns Hopkins (http://www.hopkinsmedicine.org/graduateprograms/sip.cfm), and UCLA (http://www.hsph.harvard.edu/diversity/summer-internship-opportunities). Yet there is a dearth of research on how to engage these students in academic year UR opportunities. There is a need to understand how to include underrepresented students in UR if we are to continue calls to diversify the workforce (Committee of Equal Opportunities in Science and Engineering (CEODE), 2013).

Transfer Students

The number of transfer students to four year colleges and universities is likely to increase, especially as states such as Tennessee and Oregon make community colleges free (Samuels, 2015). Recent statistics show that 914,472 students reported transferring institutions during 2006-2011 (Hossler, Shapiro, Dundar, Ziskin, Chen, Zerquera, & Torres, 2012) in the United States. However, transfer students have not been a focus for UR experiences. There is also little literature on transfer students who engage in UR and it is unknown if this group of students might experience similar benefits from participation in UR.

We draw on literature in higher education to argue that transfer students are an underrepresented group in UR. Scholars have documented a lack of attention given to transfer students in general at four-year colleges and universities. There is minimal programming for transfer students as compared to programming for traditional, first-year students (Rhine, Milligan, Nelson, 2010). Townsend's (2006) qualitative work suggests that transfer students are equally interested in graduate studies. Yet, few institutions hold faculty forums to orient transfer students with different professors and their research interests while such programs for new freshmen are ubiquitous. It is known that UR experiences provide pathways to graduate study. In fact, Townsend (2006) also found that transfer students felt more urgency to prepare for graduate school and to engage in UR because they were closer to graduation. We agree with Flaga's (2006) call for institutions to develop a transfer student seminar to connect transfer students with faculty members who can encourage involvement in undergraduate research.

Belonging

As the U.S. population becomes more diverse there will be greater racial and ethnic diversity among college student populations. One concern is that increased diversity in student populations has not been linked with the creation of a welcoming environment for these students.

Chen and Hamilton (2014) studied the increase in minorities in universities such as Harvard University. They described a surprising dissatisfaction of these students with their college experience. The Paradox of Integration theory was developed to explain this dissatisfaction (Chen & Hamilton, 2014). The theory highlights that increased representation of underrepresented groups does not equate to inclusion or belonging. Thus, underrepresented students attend schools that may not have structures that welcome them. As a result they do not feel they belong there, which leads to their negative perceptions social acceptance despite having gained access. This theory illustrates the complexity of inclusion and a need for college administrators to rethink campus climate so that it is perceived as welcoming as well as proclaiming diversity in their enrollment.

A sense of belonging influences students' academic and socio-emotional outcomes as they attempt to develop a sense of identity as college students. Levin, Van Laar and Foote (2006) reported that perceived discrimination negatively influenced Latino students' sense of belonging above and beyond factors such as having friends of the same ethnicity. Chen and Hamilton (2014) found that the strongest predictor of perception of campus diversity for Latinos was perceived social

acceptance - not the number of students present of the same race/ethnicity. These findings suggest that despite having other students of the same ethnicity present, minority students may not be necessarily feel included in campus activities or opportunities.

Case studies of non-traditional students found that integration efforts such as orientation and social inclusion (peer mentoring/meetings) contributed to increased student retention and satisfaction (Austin, 2006). The social nature (Austin, 2006) of activities that increase retention and a sense of social acceptance (Chen & Hamilton, 2014) suggest that campus involvement is vital to creating a sense of belonging for minorities.

Language of academic culture. The collegiate environment promotes a learning community; however there may be codes and habits that signal to underrepresented students that they do not belong there. Despite being present on campuses in increasing numbers, minority students may still experience a sense of alienation when left outside the academic discourse. Non-hispanic, white faculty members and students may unintentionally communicate these signals.

Researchers have begun to study how minority students acclimate and navigate an unspoken college culture that is predominantly white (Spivey & Apprey, 2014). White and Lowenthal (2011) suggest that minority students are at a disadvantage in college because they are ignorant of the non-spoken language, or academic discourse, that majority students know and navigate with ease. The discourse refers to the social practices and expectations in institutions such as college and universities (White & Lowenthal, 2011).

White and Lowenthal (2011) found that implicit languages and vocabulary welcome majority students but alienate minority students. A lack of exposure may lead to underrepresented students' unfamiliarity with the collegiate language that has been mastered by their majority student peers. Their unfamiliarity with this language may lead to a subtle, but important, disconnect between students and professors when they fail to meet expectations. For example, concepts such as verbal assertiveness, explicitness, and objectivity are all used to communicate a student's academic diligence, yet may go against cultural norms (White & Lowenthal, 2011). In contrast, a more subtle way of communicating dedication is voluntary participation, specialized jargon, and formality (White & Lowenthal, 2011). Each of these concepts and unspoken codes for conduct contribute to the impression a student gives, yet are exclusive to those who mastered the academic conventions.

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Perceived threat. As noted above, the increasing numbers of minority students does not make campuses inherently friendlier or more inclusive (Chen & Hamilton, 2014). Population increases of minorities do not shift popular opinion in favor of the newcomers (Stephan, Ybarra, & Morrison, 2009). In fact, Intergroup Threat theory suggests that increases in the number of minority populations may inspire fear, and a perceived threat to the previous majorities' way of life, culture, and social dominance (Stephan, Ybarra, & Morrison, 2009). This perspective suggests that as the number of minority students increases there may be an unconscious tendency by faculty members and students to preserve the status quo, which favors majority individuals.

Summary. Our review of the literature finds there are benefits of UR for all students. However, we need to know more about how to engage underrepresented students in UR, especially as they may

receive signals that they do not 'belong' in UR experiences. Despite the research indicating minorities can benefit from the mentoring support involved in UR, there has been little research on how to facilitate the experience itself. Further, we know little about how these UR mentoring relationships unfold, especially for Hispanic or transfer students. A sense of belonging for these students may be challenged simply by being overlooked in terms of their needs. Non-traditional students are not as visible on college campuses and are therefore missed when administration considers changes to policies and programming (Li, 2010). What can faculty mentors and university administrators do to let underrepresented students know they do belong? We examine our experiences to contribution to a conversation in answer to this question.

Study Background

In the Spring of 2014, the faculty co-author taught a seminar on mentoring that was taken by the student co-authors. The course content and simultaneous UR collaborations led to co-authorship of this paper. The institutional context and brief biographical details are presented to give the context for our experiences.

Institutional Context

The authors studied or worked at a two-year, upper-division branch campus (University of Arizona South (UAS)) of the University of Arizona (UA). UAS is designated as a Hispanic-Serving Institution. The branch campus has multiple sites in Southern Arizona, all of which are an hour or less from the U.S. border with Mexico. Students cycle through the campus quickly and usually have no experience with undergraduate research. Over 1/3 of the students are Hispanic and 59% are classified as low-income students.

Authors/Participants' Background

The students were undergraduates and worked in the Dr. Lunsford research lab. The students transferred from two-year colleges to UAS and became involved in UR during their first year at UAS. Two students enrolled in an Accelerated Masters Program (AMP), where they were dual enrolled in undergraduate coursework and first year graduate coursework. The faculty member advised their theses in the AMP.

The first author, Estrella Ochoa (EO), is a Hispanic student and went on to enroll in the doctoral program in School Psychology at the UA. She transferred to the UA from a community college and was the first in her family to attend college. Her interest in student resilience led to her working as an undergraduate researcher with Dr. Lunsford on a project to explore the experience of student teachers and students on the Arizona - Mexico border. She is interested in the influence of mentoring and UR on minority student success.

The third author, Cindy Elizabeth Chavarria Minera (CC) identifies as Hispanic. Her grandmother and mother are rural indigenous Mayan women from the highlands of Quiche, Guatemala and her father is a refugee from the Nicaraguan Civil War. She is a first-generation American and college student. She graduated with her B.A. in May, 2015 from UAS. Her aspirations are to earn a Ph.D. EO recruited her to engage in UR with Dr. Lunsford. She remained in the lab until she graduated UAS in May, 2015.

The fourth co-author, Amanda Fosmire (AF), is a first-generation college student. It took her eight years to earn an Associate degree at a community college. She married and then transferred to the UA for her BA in psychology. She worked full-time while attending school, including during the AMP program. She earned her Masters in May of 2015 and was hired as an Academic Advisor for UA.

Dr. Laura Lunsford (LL) - the second author - completed her seventh year as a faculty member at the

UA in 2015. She was a first-generation college student who earned her BA in a traditional, four-year undergraduate research intensive, public university. She teaches upper-division transfer students in psychology. During her time at the branch campus she developed a 'collaboratory' space where students meet in a lab environment both in person and virtually (using Skype) to discuss articles, report on their research projects, and seek help and feedback. Her selection for a research fellowship on mentoring and UR led to her reflection on how to attract, support, and engage all students in undergraduate research.

Method

The authors used a critical event perspective from narrative analysis (Webster & Mertova, 2007) to guide an understanding how to encourage more Hispanic and transfer students to engage in UR. In the Fall of 2015 each author wrote an individual reflection focused on when she first considered participation in UR and the critical events related to decisions to continue their participation. The reflections were then examined by all authors to identify common themes. The authors used the critical events to identify specific aspects of mentorship that facilitated student involvement in UR.

Themes

Three themes were identified that appeared to support student engagement in UR: genuine and open invitation to participate, transparency, and high expectations. Each theme is described in detail below. The intentionality of these practices on the part of Dr. Lunsford is also discussed in the analysis. Finally, an analysis of the important pathway UR provides to graduate school is considered. All three student authors have earned a masters degree and/or are currently enrolled in graduate programs.

Genuine, Open Invitation to Participate

Our analysis identified the importance of the perceived genuineness of the invitation to participate in UR and that it was a standing, open invitation. There were two factors that made the invitation appear genuine. First, the invitation was a broad one and was not perceived as being targeted at certain students. Dr. Lunsford invited everyone, not just 'A' students, students who sat in the front of class, or students who knew to stay after class. She invited all students in her classes and via a list serve to participate in her research lab. Students were still unsure initially if the invitation was meant for them. It was the repeated overtures and examples of other students' participation that helped students to perceive they were among the intended recipients.

Second, it was not a one-time-only invitation. Dr. Lunsford continued to make announcements to her classes about research and invite any interested student to participate, even after university deadlines to add independent study options. She provided examples of students who were working with her along with reporting their similar backgrounds (e.g. transfer, and first time researchers), who were doing seemingly advanced activities. These examples made involvement seem possible, through repeated invitations and varying examples of roles and expectations that any of her students could be engaged in research. If it was after the deadline to add credit Dr. Lunsford either allowed the student to participate without credit or made an arrangement to begin the next semester.

The critical events narratives revealed the considerable concerns students had about their participation in UR. Their hesitation ranged from concern about previous familial commitments and conflicting work schedules, to initial doubt of sincerity/intent of the invitation. They were worried they could not manage the workload as undergraduate researchers and doubted they had the knowledge or ability to do a good job. EO and CC recalled that it seemed wiser to refuse participation initially rather than risk giving their professor a bad impression if their performance did not meet expectations.

The critical events revealed the importance of providing examples of other students' research, which empowered the students to ask about the lab expectations. These conversations gave the students the opportunity to share their concerns. The sharing of concerns in turn enabled Dr. Lunsford and students to agree on expectations of involvement that achieved her research interests while giving the students an opportunity to 'try out' research. A quote from AF's narrative illustrates the importance of the perceived open, genuine invitation. "I always felt that I was barely skimming the surface in my understanding of research findings and the many different theories we encountered in that first semester I was involved in research. Without the open invitation and welcoming environment of our lab I would not have persisted in my involvement with research."

Further, the critical event perspective revealed that students felt their hesitation to participate in such opportunities were often interpreted as disinterest or even a refusal to participate. Dr. Lunsford reflected that the students were quite concerned about their time and even their ability to engage fully in UR. She did not initially realize the importance of issuing the repeated invitations or giving students time to think about their participation. Dr. Lunsford was also unaware of how intimidated the students were by research. A quote from EO's narrative illustrates this point, "I was severely intimidated by all the unknowns in college, and froze the first time Dr. Lunsford offered me a presentation opportunity. Instead of pressuring for a response or assuming I understand everything that would be expected of me, she left it open, telling me to think it over and come back with questions."

Trust and Transparency

The second theme highlighted the importance of establishing trust through transparent conversations. Dr. Lunsford was comfortable sharing her background and indicated that she knew being a transfer student was different – even if she had not experienced being a transfer student herself. As a result of this disclosure, the students felt they could ask questions about financing college, field/specialization guidance, and academic planning in informal short discussions before or after lab meetings. Often Dr. Lunsford did not know the answer but helped students to identify an advisor who could assist them.

The critical events analysis revealed the importance of asking questions in ways that gave students the benefit of the doubt. For instance, Dr. Lunsford experienced some frustration with the lack of progress one student was making on their conference arrangements. Despite having been a first-generation college student she assumed the student had access to resources such as a credit card. Rather than remind the student again to reserve the room (her first inclination) she asked the student why she had yet to reserve her room. Dr. Lunsford reflected, "At first, I simply didn't realize that my students might not have credit cards (needed to pay conference registration and book hotel rooms) when I encouraged them to attend scholarly conferences. I now ask more about what we take to be 'common knowledge'."

The students were unfamiliar with many experiences, such as conferences or other professional development opportunities, outside of the classroom. They felt that this lack of experience could have been interpreted as disinterest or lack of drive. In reality, the student narratives showed their ability to prioritize resources (time, money) well and according to their limited understanding of academic institutions and expectations.

The student narratives showed how important it was that Dr. Lunsford did not assume disinterest or wait for the student to take the first step if progress was slow. Instead she asked students how she could assist them. Her reflections indicated, "I have learned to tell students it is not their fault, but rather an inadequacy in their prior education, and further - these are skills that can and will be learned or they are obstacles we can overcome. There are other times they have values, different

from mine, that shape their participation. I have to remind myself that a missed deadline does not = irresponsibility, lack of interest or motivation."

The students also appreciated an environment where questions would be asked about progress or products. A critical event for CC occurred when she accidently submitted an already edited document to Dr. Lunsford instead of the revisions, "When my professor contacted me to tell me that I turned in the wrong document and that it was likely a mistake, I was grateful to have a mentor who gave me that benefit of the doubt. I felt that she trusted me, and that made my day and also let me know that she does not assume the worst of me. "

The students and Dr. Lunsford worked to maintain an environment that valued experiences and fostered open communication without judgment. The transparency in communication was critically important to student engagement. It made students feel they could share when family or work obligations meant a deadline needed modification rather than a need to drop out of research altogether.

Support of High Expectations

The critical event analysis revealed that the students had a checklist approach to their education. The checklist was limited in scope as students were first in their families to attend college. Conversations with Dr. Lunsford conveyed an expectation that students were to progress and develop their research and communication skills. She learned to ask students about their aspirations, and discovered that students were often unaware of possible career or graduate school opportunities. Thus, she became intentional in requiring students to describe their aspirations. In her written reflection she described, "I start out by asking students what they want to learn and to achieve. Sometimes they don't know what the options are! I share my fears when I first began college or graduate school and how I felt fake for a long time. Then I give my now well- known advice of "fake it - you'll make it".

AF observed, "I am not the first person in my family that has attended college, but I am the first to persist and attain my Bachelor's degree. It took me a lot longer than many of my peers to complete my B.A. and I honestly thought I had passed the point in my life where I would be able pursue a graduate program. I was older than all my classmates, married, and technically already had a career. I believed that graduate school was outside of my reach." For AF participation in UR enabled her to envision herself in graduate school and to rely on a more senior student, EO, as a role model.

Students were individually supported but one of the most important aspects of this relationship dynamic was its growth. The support Dr. Lunsford offered included relationship building, networking, and fostering leadership skills even when the students did not realize it at the time. For example, she connected CC with another faculty mentor in the psychology department for a summer research experience who became a valued mentor. CC reflected that, "I found myself in a weird mix. Being too assertive when it comes to being a Hispanic female within my Hispanic community but too submissive when it comes to the academic career. When I was taking a graduate level stats course, a mentor pushed me to stay in the course. I felt that it was too hard but he told me that I had what it took. According to my mentor, 'I fought with honor and achieved victory' when I passed the class with an A. I learned to see what my mentors saw in me and also learned that at times I may not be seeing what they see."

Dr. Lunsford also set up a cascade mentoring experience. More experienced students mentored less experienced students as they gained the experience to offer support to new students in the lab. The critical events analysis revealed that the students realized they were encouraged to move up to fill the role of a senior student, then proctor, and finally to reach out and mentor each other. Dr.

Lunsford sought to increase the skill level of the students as soon as they became comfortable with a new skill or task. She motivated the students with simple challenges that encouraged development of supportive networks outside their relationship, which motivated the students to seek out educational experiences and opportunities beyond their current plans.

These conversations often resulted in student modification of the professor's original suggestion into incremental steps. For example, the critical events narrative revealed a pivotal experience when Dr. Lunsford suggested the students give conference presentations on their work. This idea was met with immediate reluctance based on concerns about meeting professional expectations or being competent to give a presentation. Lab discussions focused on how students could gain confidence in their public speaking skills by being a teaching aide, practicing in lab, or otherwise taking one small step. For example, one student (CC) was nervous about presenting a paper alone so she co-presented with Dr. Lunsford at a conference as a first step. CC then went on to present her work alone at future conferences.

Pathway to Graduate School

The critical event analysis revealed the importance of UR in providing a pathway to graduate school for these non-traditional and underrepresented students. The students came to trust Dr. Lunsford even when they doubted their own competence at times. For example, AF observed that it was at a meeting with Dr. Lunsford that her thinking changed to help her to envision a different future for herself. She had suggested "that I complete three informational interviews in three different fields where a psychology degree would be relevant. At that moment, I realized that where my education would ultimately take me was my own responsibility. I was not aware of the amount of power that I held regarding my education. I assumed I was merely a passive learning entity until someone challenged me to adjust my perception."

Engaging in UR gave Dr. Lunsford an opportunity to share other options with students. For example, she encouraged students to apply for Summer Institutes, Accelerated Masters programs, and PhD programs. These ideas were sometimes declined and at other times accompanied by brainstorming, editing, and logistics meetings. Dr. Lunsford noted that she would keep providing ideas and invitations, and that saying no did not mean students were shut out of future opportunities. Students realized they could decline without negatively influencing their mentor's opinion of them or their potential.

As a result of these ongoing conversations students were empowered to pursue graduate studies. For example, EO noted that her UR experiences helped her to understand that she could search for opportunities and aspire to earn a PhD. Dr. Lunsford suggested that EO co-author a chapter with her on their research. This was a critical event for EO. "Despite knowing my goal was a PhD, it never occurred to me to presume I was ready to work with a professor as a co-author. Even after my Masters was complete, it was a challenge to assert myself as an academic let alone a researcher. Especially with my background, it felt almost disrespectful to question or debate with my elders rather than respectfully absorb knowledge (quietly) when it was offered."

Discussion

The analysis of critical event narratives presented a window to view inside faculty mentor-student relationships in UR for Hispanic and transfer students. This view highlights the importance of increasing awareness of those students on the periphery. This awareness went beyond seeing underrepresented students to creating a research environment in which they felt they belonged. Our analysis demonstrates how UR experiences provide a pathway to graduate education for non-traditional students.

Our experiences suggest five lessons for those faculty members or administrators who are interested in engaging nontraditional students in UR. The first two lessons point to a need for faculty members to question their assumptions about who engages in UR and how inclusive their lab climate is. The third lesson highlights the importance of structuring peer mentoring into UR experiences. The last two lessons highlight institutional-level changes in supporting and recognizing faculty members' efforts in mentoring undergraduate researchers.

First, faculty members have great power to develop student confidence to participate in UR. Underrepresented students may be unsure of the academic landscape and may feel they are presumptuous if they ask to use faculty's time and resources to become more involved in their education. Students realize that professors control who comes in and out of their lab and most importantly, who feels welcome in their lab. Faculty members may encourage nontraditional students to engage in UR by making open and genuine invitations to participate that are not bound by the academic calendar or initial student hesitancy.

Second, faculty members can create a learning space that is free of judgment on student motivation or interest. Dr. Lunsford learned that the students called this space a "no judgment zone". From the perspective of many nontraditional students, who value the role of knowledgeable elders, faculty members are respected authority figures. Early awareness of cultural differences helps not only the student but also the faculty member to increase awareness of potential misassumptions that may result from unintended intimidation. Faculty members can provide realistic opportunities for students to engage in UR that also recognize family and work obligations. Asking questions is an important aspect of this kind of learning climate. Supporting an open and understanding environment helps students feel secure enough to share constraints without fear of being judged. It is understood that faculty members must pass judgment on the competency of work produced. However, creation of an explicit no judgment zone may foster an honest student response, rather than faculty members dictating what is needed to be successful and expecting assent.

Third, our experiences revealed the importance of peer mentoring in UR opportunities. Such mentoring may reduce the workload of the supervising faculty member while providing opportunities to advanced students who can develop their mentoring skills. Engaging experienced students as peer mentors also opens lines of communications for students who may not wish to approach a faculty member directly with doubts or concerns.

Fourth, overcoming perceived and institutional boundaries in UR begins by promoting awareness of cultural differences and an understanding about how these differences may manifest in a UR relationship. Institutions may provide professional development to educate faculty members about particular cultures that may be represented among their students. In Arizona, such support may be about Mexican American or Native American students. Some institutions may have a large percentage of students on financial aid or who are first-generation college students. For example, first generation students are often learning a new dynamic for interacting with a respected adult, who may one day be an academic peer. A lack of assertiveness, hesitation to volunteer ideas, or reluctance to critically discuss a project may not be disinterest at all. A consideration of cultural norms within their ethnic community may reveal the motivation is to be respectful to an elder. Our main point is to always ask rather than to assume. For example, faculty members can also invite students to educate them about their background.

Fifth, we know good mentoring takes time and it needs to be valued and supported by the institution in appreciable ways. Institutions may support faculty in engaging historically underrepresented students in UR by both acknowledging and rewarding faculty time and effort in this area. Flexibility in

deadlines related to independent study experiences might encourage greater participation of nontraditional students in UR.

We conclude by observing that UR involvement can provide powerful learning experiences when faculty members share power with students by asking questions rather than telling, check their assumptions more frequently, and structure peer mentoring into UR experiences. Engaging students in UR can be a productive activity for faculty members to bolster their own research and labs when properly supported and acknowledged by their institution. UR also provides the opportunity to create and supervise a sustainable cycle of mentoring with more advanced students and incoming students to distribute the mentoring workload. Although there are legitimate concerns regarding the costs of mentoring in UR for faculty (Schwartz, 2012), we propose it as a viable option to support UR when properly acknowledged by institutions. Our review of the literature revealed little scholarship on how institutions might support faculty members to engage in UR. One exception is a multi-institutional study by a team of researchers (Lunsford et al., forthcoming; Baker et al., under review) that emphasizes ways institutions can better support faculty members to engage more students in UR opportunities. We call on scholars to examine both individual and institutional changes that may support underrepresented undergraduate students in research.

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