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RESEARCH ARTICLE:

Mentoring Undergraduate Research in Different College/University Settings

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Abstract

One innovative strategy that can improve higher education is undergraduate students' engagement in research. Mentoring is one of the few opportunities that afford extended face-to-face and one-on-one instruction. However, mentoring undergraduate students in doing research is not the same at different types of colleges and universities. This paper gives insights from my perspective on how undergraduate students are being mentored in doing research in different university/college settings, namely a premier university (University of the Philippines Los Baños), a public research university (University at Buffalo), a public senior college (York College) and a private university (Pace University). The main goal of this paper is to compare the undergraduate research structure at the four institutions. I will discuss the advantages and disadvantages of each setting, emphasizing how I engaged my students to do research with emphasis at Pace University. This paper also includes the similarities and differences in how students achieved the following learning outcomes: knowledge, skills, attitudinal outcomes, and learned abilities.

Keywords: *undergraduate research; learning outcomes; experience; skills*

Introduction

The Council of Undergraduate Research has defined undergraduate research (UR) as "a mentored investigation or creative inquiry conducted by undergraduates that seeks to make a scholarly or artistic contribution to knowledge". It is one of the high-impact education practices (HIEP) implemented at most colleges and universities, engaging students and increasing student retention, persistence and success (Kuh, 2008). These high-impact practices, which also include learning communities, writing-intensive courses, e-portfolios, and internship programmes, to name a few, are active learning practices that promote deep learning by student engagement as measured by the NSSE. Among the HIEP, UR has been shown to have the most positive impact on promoting sciences to students. A lot of literature reports on its benefits (Adedokun *et al*., 2014). Even though UR can be expensive in terms of time and money, it has been proven to be effective in enhancing the student's overall college experience and in recruiting, retaining, and graduating students, especially underrepresented minorities in science, technology, engineering, and mathematics (STEM) fields (Graham *et al*., 2013; Kuh, 2008; Russell, Hancock and McCullough, 2007). Although it had an impact on students of all disciplines, there are more opportunities for STEM students to engage in UR than non-STEM students (Russell *et al*., 2007). The UR experiences are increasingly recognized as an essential component of the effort to retain students on a scientific career path (Graham e*t al*., 2013; Russell *et al.*, 2007).

It is believed that the UR experience improves the next generations of scientists' preparation as students learn to think like scientists by conducting their own investigations, research, and practices

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under a mentor (Birney *et al*., 2021; Farshi *et al*., 2021). Additionally, UR demonstrates substantial gains in problem-solving and research skills, and students who participate in UR are satisfied with their overall education experience (Hathaway, Nagda and Gregerman, 2002; Lopatto, 2010). In addition to enhancing students' critical thinking and intercultural competence, undertaking UR instills a positive attitude toward literacy (Kilgo, Ezell Sheets and Pascarella, 2015).

In this paper, I would like to reflect on my personal experiences with the practices of UR in institutions with different settings that I have been with. The aim of this paper is to compare the setup and structures of UR in the four institutions. The advantages and disadvantages of being a mentor in these four institutions were also discussed. I also included discussions on how these experiences helped me become a better mentor to students not only doing UR but also in preparing them to enter graduate school and the real world after graduating college. Lastly, I would also like to share the present endeavor that I am doing at Pace University, where I implemented a systematic approach for students doing UR and how I expanded UR by modifying the laboratory course I am teaching into a course-modified undergraduate research experience (CURE) class.

I was part of the four institutions discussed in this paper. I was an alumna of the University of the Philippines Los Banos (UPLB) and taught there from 1999 to 2005. Upon completing my MSc in Agricultural Chemistry in 2003, I had my first research group, with around 20 undergraduate students completing their thesis from 2003 to 2005. While pursuing my PhD at UB (I completed my PhD in 2010), I supervised four undergraduate students (three registered for an UR course and an REU student working under my PhD advisor from 2007 to 2010. While working at York College as a postdoc and adjunct faculty starting in 2011, I assisted some students of my postdoc mentor doing UR. At Pace University, I have an active research group of students doing UR since 2012. I continued work with some students of my postdoc advisor until 2015. I currently work as an adjunct faculty at York College, even though I am already a tenured Associate Professor at Pace University. This setup allowed me to have access to high-end instruments at York College that enhanced and improved the studies done by my research group at Pace University

The University of the Philippines Los Banos (UPLB) is one of the eight constituents of the Philippines' top university system and the first constituent of the UP system that evolved into a premier educational and research institution, not only in the Philippines, but also in the Southeast Asia-Pacific region. At UPLB, undergraduate student is required to submit a thesis as a requirement to complete their undergraduate degree. This thesis is based on an original research done under the supervision of a faculty member in the student's field of specialization. The thesis requirement, which basically forces one to do UR, is being practised at UPLB and all colleges and universities in the Philippines. For Chemistry or Agricultural Chemistry majors, students register either for CHEM 200 or ACHM 200 (Undergraduate Thesis), a 6-credit course that can be divided into two or more semesters.

A flagship institution of the State University of New York (SUNY) system, the University at Buffalo, is the largest and most comprehensive campus in the 64-campus SUNY system. It is a public research university with a student population of around 32 332 students (21 467 undergraduates) as of the Fall of 2021. On the other hand, York College is one of the senior colleges in the City University of New York (CUNY) system located in Jamaica, Queens. It enrolls around 8 000 students of different backgrounds. My mentoring experience in UR at these institutions (UB and York College) was based on my interaction with undergraduate students who worked in the laboratory of my mentors (PhD and postdoc). My knowledge of school or department policy regarding undergraduate research is limited. My information mostly came from students doing research and enrolled in research courses for credits under my mentors. At UB, students registered for CHE 498 (Senior Research), supervised research under the direction of a chemistry faculty ranging from 1 to 3 credits and can be taken for

more than one semester. On the other hand, York College offers CHEM 490, 491 and 492, which are all Independent Study courses with 3 credits and a minimum of 6 hours per week requirement for each course. A student can only register for one independent study course per semester.

Lastly, Pace University is a private, non-sectarian educational institution founded in 1906 with 12 835 students enrolled (7 994 undergraduates) during the Fall of 2021 on New York City and Westchester campuses. In a list of "Colleges with the Highest Student-Mobility Rates, 2014" published by the Chronicle of Higher Education in 2017, Pace University was ranked number one among private, non-profit, four-year institutions nationwide. The list is based on the data of a study (Chetty *et al.*, 2017) that compared the median parent household income for students at colleges and universities across the country with the earnings these same students achieved after graduation. Pace University's signature program, "Pace Path", provides each student with an individualized plan that prioritizes achievement in experiential learning, strong academics, dedicated one-on-one mentoring and advising with faculty and staff, and customized goal setting. Students are allowed to do UR, one of the "Pace Path" activities.

Undergraduate Research Structure and Mentoring

Undergraduate research is not required (unless the students are in the Honors program) but is encouraged in US-based institutions. Students in the Honors program at Pace University and all US-based institutions with Honors programs must have completed a thesis to graduate. This is similar to the requirement in UPLB, which has a more stringent policy than its US-based counterparts. Although the term undergraduate research is not really emphasized in the Philippines, the thesis requirement for degree completion can still be classified as UR. Most UPLB students are delayed in their degree completion and graduation because of the thesis requirement. Looking at the four institutions, in general, there is really no significant difference in terms of the UR structure. In all instances, most of the students doing research are in the same field as their faculty mentors. If not, it is within relatable fields like Biology or Engineering majors working in a Chemistry laboratory. The student can research for at least a semester or more in the mentor's laboratory. In addition, some big universities like UB have programmes that fund students to do research during the summer. These students are selected from different parts of the country. One such programme is the National Science Foundation Research Experiences for Undergraduates (NSF-REU). During my time at UB, the research group handled some of the undergraduate students from other institutions who spent their summers as REU grantees. In one of those summers, he handled an REU student in addition to students who did UR during the regular semester.

The UR setup in the four institutions follows the classic apprentice model, where a student is mentored by a faculty or a senior member of the group (postdoc researchers or graduate student). It was reported that it is in a research group where students' apprenticeship or UR experience happened. This research group is usually led by a faculty mentor (lead research or primary investigator), has a group of students (graduate and undergraduate), and is assisted by a postdoc and technical staff (Feldman, Divoll and Rogan-Klyve, 2013). The research group can classify as either loosely organized, where the faculty mentor is the center of action with students working individually (do fieldwork, collect samples and bring them to the lab to be analyzed), or tightly organized, where students associated with all of the faculty mentor's projects and work together in shared laboratory space (Feldman, Divoll and Rogan-Klyve, 2009; Feldman *et al*., 2013). In addition, in a loosely organized group, the faculty mentor meets with students one-on-one to discuss their research progress and provide guidance, while in a tightly organized group, regular group meetings are held to update their research progress, share knowledge and skills, and critique one another's research (Feldman *et al.*, 2013).

At UPLB and Pace University, I served as the faculty mentor, where I directly mentored undergraduate students with help from senior group members. On the other hand, as a graduate student at UB and as a postdoc researcher at York College, I served as a mentor to undergraduate students working in the research group of a faculty mentor. The UPLB setup was purely a loosely organized group, as students individually did their own research directly under the supervision of the faculty mentor. Although they have the same research study (fabrication of sensors for detection of heavy metals with different sensing materials), only a few group meetings were held, and students met with the faculty mentor one on one to discuss their progress. The only instance that another student (usually a senior member of the group) got involved was when new students were needed to be trained on how to use an instrument or fabricate electrodes. It was observed that the exchange of information was found to be faster when being done by peers. This type of practice was also used and refined at Pace University.

The setup at UB was tightly organized for the graduate students, but loosely organized for students doing UR. Regular meetings were held where research progress was updated, but undergraduates seldom participated in the deliberation. Most of the time, the undergraduates are assigned to help a graduate student do some routine tasks (sample preparation and data processing) and some case menial tasks (like washing glassware) or do a mini-project related to a graduate students' work. Usually, the undergraduate day-to-day activities are done as directed by the graduate student. The same thing can be said about my experience at York College. Being in charge of the laboratory's day-to-day activities, students would usually ask for technical advice whenever there was a problem in their research. Students interact more with the faculty mentor, since most group members are undergraduates, unlike at UB, where the research group comprises mostly graduate students. In this situation, the faculty mentor has more direct control over the undergraduates at York College, and regular group meetings are held thatso students can present their research progress and deliberate with other students. This is the same setup for the research group at Pace University, save for the absence of postdocs and graduate students. In their replacement are senior students who are tapped as Big Brother or Sister with the goal of training new students to take over the project once they graduate. Students are encouraged to work on more than one project if their schedule allows it. There is direct guidance from the faculty mentor, and regular group meetings are also held. The York College and Pace University research groups adopt a loosely and tightly organized group. What really determines whether a group is tightly or loosely organized is how research is conducted in the scientific domain (Feldman *et al*., 2013).

Although mentoring entails giving opportunities to undergraduates, they have a different experience at UR because of the mentor. Mentoring can provide students with UR experiences with a competitive edge over typical laboratories or research groups and enhance student impact. It provides students with guidance and helps them develop their scientific identity and personal development as scientists. As mentioned earlier, the student-faculty mentoring relationship exemplifies the classic apprentice model and supports the students' learning, personal and professional development, and socialization (Baker *et al.*, 2015). The structure of mentoring, as I experienced, can be summarized in Figure 1 in the institutions involved. The faculty mentor directly interacts with the students, except at UB where a graduate student supervises the undergraduate. Even though this is common practice at big research universities, undergraduate students can still be supervised directly by a faculty mentor at some institutions. In contrast, the graduate student is tasked to guide the undergraduate student on the day-to-day tasks. This setup can be advantageous to the undergraduate because there is the opportunity to gain UR experience from more than one mentor. This is also the same setup at York, where aside from the faculty mentor, the student can also learn a thing or two about research and being a scientist from the other mentor(s) in the group. My experiences in mentoring undergraduates during my time as a PhD student and postdoc were helpful career-wise when I

formed my research group at Pace University. Graduate/postdoc mentors were reported to gain many benefits, including improved qualifications and career preparation, cognitive and socioemotional development, teaching and communication skills, and greater enjoyment of their apprenticeship experience (Dolan and Johnson, 2009).

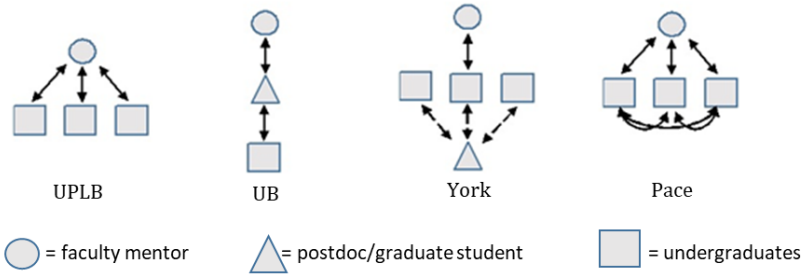

Figure 1: Mentoring structure that I experienced in four institutions.

At UPLB, the faculty mentor worked directly with undergraduate students. In contrast, at UB, a graduate student or postdoc served as the immediate supervisor of undergraduate students, all working under a faculty mentor. At York College, as a postdoc, I acted as a secondary advisor to undergraduate students who often asked for help in their research. Lastly, at Pace University, the faculty mentor interacts with undergraduate students who are encouraged to interact among themselves.

It has been reported that students consider a good mentor someone who has "time for the mentee" and listens to the students (Houser, Lemmons and Cahill, 2013). Faculty mentors from big research universities usually have limited time for undergraduates, resulting in students working independently and depending on postgraduates, technicians and graduate students. Based on my experience, mentoring by graduate students, postdocs or senior students tends to focus more on the technical aspects of the projects. In contrast, faculty mentors (or lead researchers) are likely to help students build a scientific identity by articulating their knowledge, reasoning, or problem-solving skills (Linn Marcia *et al.*, 2015). This could be the reason why students are more likely to participate in directed research with a faculty member in a small liberal arts institution like Pace University (Thiry, Laursen and Hunter, 2011) than in a large research university like UB (Fechheimer, Webber and Kleiber, 2011) where faculty mentors are not always accessible and do not meet the undergraduate students regularly (Morrison-Beedy *et al.*, 2001).

Although mentoring aims to provide undergraduates with a greater understanding ofsScience and to help them develop their scientific identity, mentors should also have their own reasons for doing this. There are different reasons why some faculty want to do UR with undergraduates, as discussed in a paper (Dredger *et al.*, 2018). Some do UR because it offers an opportunity to work with undergraduate students to do research, which is the purest form of teaching, while others who do URs report an increase in the quality of their work life, combats faculty turnover, and leads to increased creative synergy (Dredger *et al.*, 2018; Lunsford *et al.*,, 2013; Webber *et al.*, 2013). Doing UR with undergraduates takes a lot of time and can be challenging with demands for grant writing, publication, university service, and teaching (Dolan and Johnson, 2009). Among the four institutions, UPLB, York College, and Pace University offer incentives linking UR, at least in part, to tenure and promotion decisions. Although this is concerning to some faculty who already feel time-crunched with some of them supervising and spending an additional 3 to 5 hours per week doing UR, this can be remedied by finding ways to relate the work they do with URs to manuscripts they write, reducing the typical teaching-research tug-of-war (Toepfer, 2009). When research is already part of the

faculty's agenda, like what I did at UPLB and Pace University, it is just a matter of finding a research topic that interests both the faculty and the students. (Dredger *et al*., 2018).

Lastly, the mentoring style of faculty mentors can also impact the students' experience. The relationship of students with faculty can be defined as 'autocratic' (lack of independence), 'laissez-faire' (lack of oversight and mentoring), or 'democratic' (collegial) based on the Lewin, Lippitt and White (1939) definition of management styles (Lewin *et al.*, 1939). Although one study shows that the 'democratic' style gained positive reviews in comparison to the negative reviews from the 'laissez-faire' style, these mentoring styles are different with respect to the time of transition from a dependent to an independent relationship between the faculty and student, which determines the length of time that the student is provided with hands-on experience on how scientific research is conducted (Houser *et al.*, 2013). This can be improved by finding the right match between the mentor and the students. For instance, the autocratic style is practised when the student is starting to do UR, and there is only a limited time frame, like summer. However, as the student becomes an expert and more independent in doing UR, there is a shift to democratic or laissez-faire styles. This has been practiced at all four institutions.

Goals and Learning Outcomes in UR

As one of the high-impact educational practices with a proven track record of student success and lifetime benefits to students, all US-based institutions discussed here have UR programmes with an office to oversee them. In recent years, school administrators have become increasingly responsible for assessing the effectiveness of their UR programmes concerning various student success measures. It is challenging to identify UR learning outcomes that can be applied across disciplines, given that "students and their research advisors experience UR differently, depending on their discipline and its intellectual and pragmatic ways of working" (Hayes-Harb, Andre and Shannahan, 2020: page?). Even though there is literature that discuss the assessment of learning outcomes, the one used by the University of Utah can be used as a good example as it can be applied in all disciplines (Hayes-Harb *et al.*, 2020). In addition, one paper listed the five essential skills: creativity, judgement, communication, organization, and persistence needed to make the leap from gaining knowledge from others' discoveries to making discoveries on your own (Showman *et al.*, 2013). Applying the five skills will have a student transition from being a student to becoming a researcher, moving from the learning to discovering stage.

When I started mentoring undergraduates at UPLB, the overall goal for the student was to complete and defend a thesis, an original research conducted under a faculty mentor. The learning outcomes were unclear to the students; however, different learning outcomes were accomplished along the way. Knowledge outcomes would come from knowing what the research is about and the principles behind the methods and experiments used. In addition to acquiring research-specific knowledge, the students should develop transferable skills which can be useful for broader applications. Among these are literature gathering, critical thinking, problem-solving, independence, collaboration, and communication skills. Since I was just starting to mentor students by then, these skills were not discussed with the students. Students are expected to acquire them while doing UR with the hope that when they graduate, they attain learning abilities and integrate knowledge and skills with whatever affective outcomes they learned along the way. Since the students will defend their theses orally, all those learning outcomes are expected to be attained by the time they graduate.

At UB and York College, I concentrated more on providing knowledge and teaching basic laboratory skills and techniques to the students focusing more on the technical aspects of the research. It is up to the students to obtain the other learning outcomes from the faculty mentor (my PhD and postdoc advisor). UB and York College students must submit a paper about their research at the end of the

semester to earn a grade for the course they registered for and meet the learning outcomes. In addition, everyone is encouraged to present their results at school and local conferences. Students funded by REU and LSAMP programmes at UB and York must present their research posters in in-house or local meetings. Whatever presentation needed to be done, I helped my students to prepare for these events in one way or another (like practising what they would say or what questions could be asked. This allowed me to gain additional mentoring experience that proved helpful when I became a faculty mentor at Pace University.

Pace University Experience as Compared to Other Institutions

Based on my earlier experience in mentoring, I was motivated to become a faculty mentor at any primarily undergraduate institution (PUI) which focused more on teaching than research. Unlike Research 1 (RI) institutions or big universities like UB, faculty at PUI are often faced with problems such as a lack of time, funding, and facilities and a lack of graduate students to perform research. However, I have already experienced these problems before. For the lack of time, I have experienced teaching at least 18 hours per week at UPLB. This was maintained when I pursued my MS degree, where I had to take graduate courses and do my thesis. After completing my MS, I had to work with my research group). While at UB, I was a teaching assistant (TA) for the whole duration of my PhD study, including working as a TA or as a laboratory technician during summers.

The time I had at UPLB proved to be helpful in solving the lack of funding, facilities, and manpower (students). My experience as a mentor of a research group with limited resources proved to be handy as I worked with undergraduate students on any available instruments, limited funding (mostly personal funding to purchase reagents and materials), and I was still able to deliver results (theses, presentations, and publications). These problems would be resolved when I started at Pace University as there are more available instruments to use and some in-house grants that can be applied in addition to the start-up fund given to me. In addition, York College has high-end instruments that can be utilized for research purposes. I remained an adjunct at York College for the sole purpose of having access to these instruments for the sole purpose of upgrading the research done by my students at Pace University. The manpower came from students of the Department of Chemistry and Physical Sciences who are majors in Forensic Science, Chemistry, and Biochemistry.

Lastly, the university has financially supported several programmes that look at undergraduate research and training. The university compensates the cost of reagents for all faculty-led research courses offered to any students. The Undergraduate Research Initiative programme by the Provost's office supports several research projects performed during either the school year and/or summer. A grand showcase is held at the end of the school year, and a winner is awarded financial support to enhance their research or present their results at national conferences. During the summer, students can also apply for research support from the Dyson College of Arts and Sciences Undergraduate Research Program. Apart from covering the cost of reagents, these programmes also provide student stipends. In addition, research awards to faculty to cover research costs and support faculty and student travel are offered at Pace University. The financial commitment from the university ensures that students have the support to carry out experiments, gain hands-on research experiences and, to some extent, allow students to present their results at conferences and scientific meetings. The department's faculty and students, including my students, often receive these highly competitive grants. These grants are just some of the in-house funding that can be applied to support research activities at the university. The availability of in-house grants is a great advantage for institutions doing UR. In some instances, students who applied for these grants can propose their own research to be approved by the mentor, making it unique. At most institutions, the research/study is usually given to the students by the mentor. Not all colleges and universities have these resources. UB and

York College have some financial support for undergraduate research, while UPLB depends on the funding of the mentor (availability of projects)

With all this support, I recruited students to work with my research group, which specialized in developing instrumental methods (Spectroscopy, Chromatography, and Electrochemistry) to analyze chemicals of interest in different fields. This recruitment is usually done by discussing the benefits of UR as early as the first year of students when I handled General Chemistry courses and targeted the top performers from my class as prospective researchers. When I meet them again in the second and third year, when I teach an Analytical Chemistry course, some are already working with me. At the beginning, I personally trained students on using instruments and the everyday activities in the laboratory. As time passed, I delegated these tasks to senior students who were much more willing to perform them. The new members are paired with senior members and will take over the project once the seniors graduate from the university. In doing so, they gained affective outcomes and learned abilities in addition to knowledge and skills outcomes they already have. By helping junior students, they learn empathy and respect for others and embrace leadership and teamwork. In most instances, they tried to solve the problems they encountered on their own while doing research. There is a regular group meeting where they enhance their communication skills. The minimum requirement is a conference presentation, particularly a poster, at the American Chemical Society (ACS) national meetings. If they are Honours students, they need to get an in-house grant or have their research funded. Honours students must submit a thesis, which usually serves as the first draft of a publication, to be submitted to a peer-reviewed journal in the near future. This system was well implemented until the pandemic caused a disturbance. I had to train new students again, since the knowledge transfer from senior members to new members was affected.

Although only one semester of CHE 480 (Research in Chemistry) was credited, some students would spend at most six semesters doing research. These students who spent a longer time doing UR benefit more, gaining almost, if not all, learning outcomes listed in one paper (Ewell, 2001). Members who stay longer tend to give more presentations, obtain grants, become leaders in some research studies and the group, train new students and end up with publications. It is also noted that their attitudes change the longer they are in the group, and they become and think more of a scientist. For some, they aspire to have more presentations and publications to enhance their resume (Farshi *et al.*, 2021). This confirmed the study that longer UR experiences gave more benefits to the students (Adedokun *et al.*, 2014). Based on my experience, it should be noted that students who do not stay more than one semester are not satisfied with the UR experience at all institutions. At UPLB and Pace University, students ended their UR stint by the time they graduated, unlike at UB and York College, where some students stopped doing research after earning research credits. At all institutions, some students published their results in peer-reviewed journals. I have publications with undergraduate students as co-authors at all institutions except UB, although a paper was submitted but rejected in a peer-reviewed journal. Almost all students with publications are the one who did research at a longer period. As much as possible, papers were submitted to journals with specialization of the mentors and some were high-impact-factor journals. However, the longer waiting time for publication in these journals forced me to submit some smaller but validated studies to undergraduate journals like *Journal of Undergraduate Chemistry Research* while submitting a paper or two to journals with an impact factor higher than 3.

Course Undergraduate Research Experience: Expanding Undergraduate Research

As I continue to engage students at Pace University in UR, I modified the course I teach, CHE 221 (Analytical Method and Techniques), into a course-based undergraduate research experience (CURE) course starting in the Fall of 2021 to give students more opportunities to engage in UR. Although this

project is a make-up for missed opportunities for students to enhance their hands-on experience and technical skills after being impacted by the pandemic, the learning outcomes (particularly knowledge and skills outcomes) are the same as that of UR. With funding from the Classroom Based Research Experiences Award program from the Office of Research at Pace, each student in the course was tasked to analyze a consumer product like calcium and magnesium in bottled water and milk samples or fluoride content in mouthwash and toothpaste samples. The methods used are based on the listed experiments performed in the course. The interaction and setup are almost identical to the one-on-one UR, where students are directly supervised by a mentor and, in this case, me (the lecturer and laboratory instructor). It has been said that the CURE setup can affect more students than the apprenticeship model. Although students are required to write a paper about what they did, like their laboratory reports, seven out of 16 students opted to continue doing their research by the following semester and presented their results in conferences, with 3 presenting them at the ACS National Meeting at San Diego. These students definitely attained more learning outcomes from these UR experiences.

Conclusion

The main goal of UR is to allow students to enrich their undergraduate experience. Despite differences in the setup in the four institutions I discussed, the objective remains the same. Students could learn from mentors not only knowledge and skills to understand the research (or science) they are working on but also to help them develop their own identity as a scientist. The same thing can be said about the learning outcomes, which tend to be the same, whatever the institutional setting. Although big universities have faculty, who have less time for UR, the presence of postdocs and graduate students acting as additional mentors is a big advantage for students because they can gain more knowledge not only from one mentor. At the same time, these postdocs and graduate students that act as mentors can also acquire knowledge that can be helpful in their future academic careers.

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