PURM
Perspectives on Undergraduate Research & Mentoring

Reflections on the Impact of Exposing Students Outside the Classroom Through Presentations and Publications

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Introduction

It has been known that the best way students learn science is by conducting their own investigations, research, and practices, just like what scientists do (Birney et al., 2020). Students can have firsthand experience as scientists if they are involved in undergraduate research, one of the high-impact practices (HIP), because they engage students in active learning that elevates their performance on desired outcomes (Kuh, 2008). The undergraduate research experience is widely touted as an effective educational tool to enhance the university experience with many benefits, and the increased interest in a science, technology, engineering, and mathematics (STEM) career is the most important (Lopatto, 2004). Studies have shown that authentic research experiences help aspiring scientists better understand and practice science (Lopatto, 2004, 2007). There are two variants for undergraduate research. The first one is undergraduate research experiences (URE) which uses the apprenticeship structure in which the undergraduate student works one on one with a more experienced researcher (e.g., faculty, postdoc, or graduate student) (Rodenbusch et al., 2016). This can happen in a principal investigator's (PI's) lab over one or more semesters. The summer undergraduate research experience (SURE) also follows the apprenticeship structure where students intensively engage in research for numerous weeks. Typically, these summer programs are competitive since National Science Foundation–Research Experience for Undergraduates (NSF-REU) programs or universities fund them to give research experience to selected students. Since both URE and SURE have a one-on-one structure between a mentor and a student, this type of scheme, known as the apprenticeship model, is limited by the mentor's availability (Bakshi et al., 2016).

The other variant of undergraduate research alleviates the problems posed by URE and SURE, especially in terms of the number of students and mentors involved. Course-based undergraduate research (CURE) is a great learning experience where an entire class of students addresses a research question or problem with unknown outcomes or solutions of interest to external stakeholders (Dolan, 2016). CURE offers the capacity to involve many students in research (Rowland et al., 2012). It can give an opportunity to serve all students who enroll in a course. With its potential to be integrated into introductory-level courses, the early exposure of students to CURE can have a greater impact on their academic and career paths than URE or SURE, which occur late in an undergraduate's academic program (Hunter et al., 2007). At present, many institutions, including

where the mentor is affiliated, see CURE as a mechanism for improving STEM majors' graduation rates, retention rates, and student persistence (Auchincloss et al., 2014; Bangera & Brownell, 2014; Dolan, 2016).

Pace University Undergraduate Research

At Pace University, a private non-sectarian institution with a campus based in New York City, a year-long CURE embedded curriculum (Genetics during the fall semester and Cellular and Molecular Biology during the spring semester) offered to STEM majors was successfully implemented in the Department of Biology (Peteroy-Kelly et al., 2017). Assessment results from this practice showed that low-performing students immersed in a year-long CURE made significant gains (with no decline in other aspects of learning) in experimental design skills and in their understanding of fundamental biology concepts. This assessment was based on a comprehensive three-point assessment utilizing student grades, students' perceptions of gains, and three validated concept inventory pre-/post-tests: the Genetics Concept Assessment (GCA, 32), the Introductory Molecular and Cell Biology Concept Assessment (IMCA, 33), and the Rubric for Experiment Design (RED, 34) (Peteroy-Kelly et al., 2017). This is still implemented as the Dean's Office supports this program. Groups of four students choose two of 6,000 different yeast genes and design and carry out their own unique cell biology, biochemistry, or molecular biology experiments to study gene function.

Additionally, the Department of Chemistry and Physical Sciences also offers undergraduate research opportunities (Table 1). Some students can do undergraduate research as early as the second year after the discussion of opportunities and benefits of undergraduate research during their first year. Some students begin undergraduate research with faculty as early as their second year, following the apprenticeship or one-on-one model. Except for a research course, CHE 480 (Research in Chemistry), a variant of the CURE idea was adapted by Dr. Mojica in CHE 221 (Analytical Methods and Techniques). This course is taken by Chemistry, Biochemistry, or Forensic Science majors during their junior year. Offered during the Fall semester, CHE 221 is one of the few courses where students from Pforzheimer Honor College can enroll for Honors credits. Honors students opting to take this course are given additional requirements in the form of a mini-research project (usually similar to one of the experiments performed in the lab but using other samples), resulting in a research paper. The topics chosen are related to the course experiments with possible application to research like analysis of zinc in commercial tablets, calcium and magnesium analysis of different water samples using titrimetric and instrumental methods, and iron content in different food samples. If the student becomes interested in the research topic and expresses a desire to present at a conference, the student is given the option to join Dr. Mojica's research group and start performing laboratory work during the winter break or at the start of the Spring semester to be able to present in conferences during the semester. Students are also given a chance to continue this research option when they take CHE 331 (Instrumental Analysis), where Dr. Mojica is the instructor of the laboratory class.

Table 1. *Undergraduate research opportunities at the University taught by the instructor/mentor*

	Fall Semester	Spring Semester
First Year	Students are introduced to the opportunities and benefits of UR in General Chemistry courses handled by the author/mentor and other faculty.	
Second Year	Students are taking Organic Chemistry courses, and some students opted to start doing UR.	
Third Year	CURE-modified CHE 221 course with research option taken by Honors students	CURE-modified CHE 331 course offered with research option in laboratory class.
Fourth Year	Students doing UR take CHE 480	

On the other hand, non-Honors students already part of the research group took the research option, and instead of performing extensions of CHE 221 and CHE 331 experiments, they continued working on their ongoing projects such as analysis of chemicals of interest in food science, environmental science, and natural products with the intention that the results were going to be presented in future conferences at the local, regional, and national levels. These courses (i.e., CHE 221 and 331) ended up being similar to CURE courses since both are designed for students to collect data and then analyze the data they collect (Brownell et al., 2015; Cooper et al., 2019) and then include creating posters and disseminating the work through written artifact (Kerr & Yan, 2016). After taking these courses, most students continue to do UR in the apprenticeship model, present their results in conferences, and become published in peer-reviewed journals or book chapters.

Research Group Structure

The Mojica research group (https://mojicagrouppaceuniversity.weebly.com/) specializes in analytical chemistry utilizing instrument-based methods (chromatography and spectroscopy) to analyze different chemicals in different samples. Among the research area covered by the group are material science (sol-gel and nanomaterials), natural products (nutraceutical products such as tea and bee propolis), environmental chemistry (Billion Oyster Project and emerging contaminants), and biochemistry (protein and enzymes interaction with other chemicals).

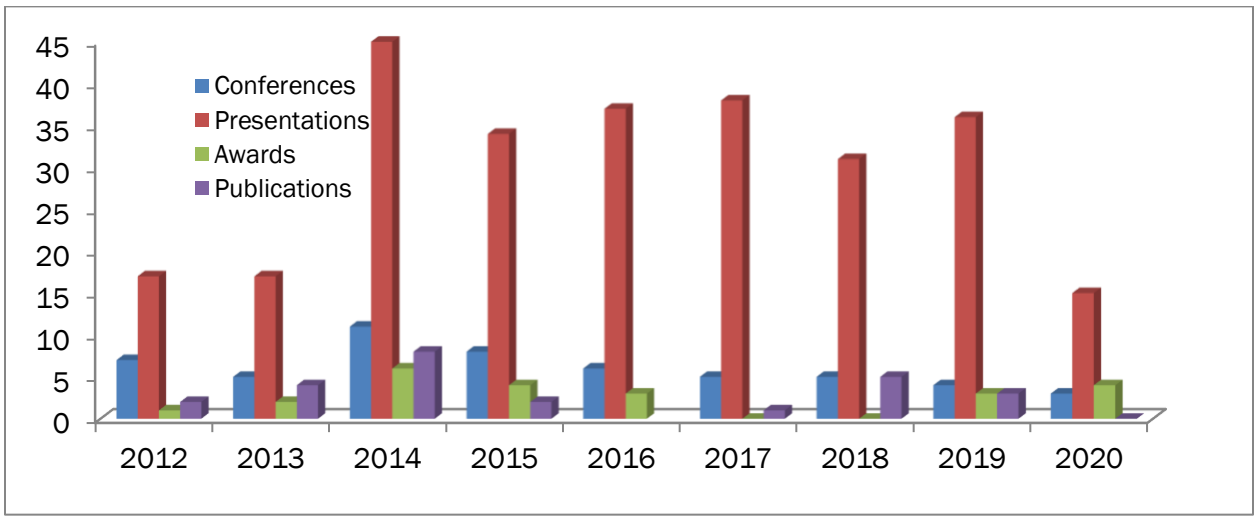
The time students do research in the group ranges from one semester (taking the research option of a modified CURE course) to six semesters (starting sophomore year until graduation). On average, the student spent three semesters doing research. During their stay in the group, they perform typical tasks associated with research such as conduct experiments, gather, process, and interpret data, present results in meetings and conferences, and write a report that can end up as the first draft of a paper submitted for publication.

Most group members were students of Dr. Mojica in General Chemistry courses during their first year and were invited to join the group by the third year. A briefing with the student is held where short-term and long-term plans are made known. After this stage, a senior member is assigned to help the student get familiar with the research topic and train with the skills needed with the hope that the student will take over the project once the senior member graduates or leaves the group. This initial set-up follows the first four salient practices of UR mentors, namely 1) engaging in strategic pre-planning, 2) setting clear and well-scaffolded expectations, 3) teaching technical skills, methods, and techniques, and 4) balancing rigorous expectations with emotional support and appropriate personal interest in students (Shanahan et al., 2015).

Since monthly group meeting were held, after the initial semester (whether enrolled in CHE 221 or working as an undergraduate researcher), students became close with other senior members and built a community among themselves, another salient practice of mentoring UR (Shanahan et al., 2015). Senior members are also given opportunities to become leaders as they become more active in helping other members. They prepare new members for presentations in conferences or lead a mini study to explore the topic they are currently conducting more in-depth, hence giving them more ownership of their research with time. They are given the opportunity to apply for in-house grants to further their studies. Since 2013, 25 members have become recipients of this grant, where the university gives them financial support ($500) during the summer or school year to fund their studies. Since 2020, this was increased to $1000. The aforementioned set-up covered the other salient mentoring practices like one-on-one hands-on mentoring, increased student ownership of the research, support for students' professional development through networking, laddered opportunities for peers, and 'near peers' to learn mentoring skills (Shanahan et al., 2015). Students who took the research option in CHE 221 or CHEM 331 are encouraged to present at the Dyson College Society of Fellows Annual Meeting held during the spring semester in addition to the

research paper. This Society of Fellows is the premier honors organization in the university. A quarter of the 60 group members ended up as fellows, with some members being recipients of the Distinguished Graduating Fellow award from 2016 to 2021. Everyone can present in other local, regional, and national conferences held at any time of the year, although the spring semester is the busier time for presentations. Among the events participated by the group are UR symposia in universities, Eastern Colleges and Science Conference (ECSC), and American Chemical Society (ACS) local, regional, and national meetings. Before 2017, only the senior members could attend and present in the ACS national meetings due to limited funding. However, since then, all members presented in the ACS national meetings because of the funding support from the university. Some members also garnered best poster and best presenter wards in events where they presented their projects. Encouraging students to disseminate their findings and provide guidance on how to do so effectively in oral and poster presentations and in writing is the last salient mentoring practice mentioned by Shanahan et al. (2015). Figure 1 summarizes the outputs and accomplishments of the students in the group.

Figure 1. *Accomplishments of students from the research group from 2012-2020*



Students' Reflections

The student-respondents (Table 2) were chosen since they served as a group leader at one time or another. All of them ended up as accomplished members who presented at conferences, received awards/grants, and published papers. For example, Jo and Gwen have presented four times at the ACS national meetings. Jahaira, Gwen, and Ally have been selected as the Distinguished Graduating Fellow awardees by the College Society of Fellows. Multiple students have also been the recipients of the Undergraduate Research Initiative grants and published papers (e.g., Alvarez et al., 2021; Baria et al., 2014; Dai et al., 2018; Mojica et al., 2018; Mojica et al., 2014; Pace et al., 2015; Symczak, 2016-2017; Zapata, 2018). All were asked for their reflections in UR by answering six questions. The first five questions are related to their UR experience. The last question pertains to their experience in the modified CURE courses and their opinions in making them full-time CURE courses. The student respondents were given these questions and were asked to give their answers and comments.

The goals in using these questions are to get feedback and reactions from the students on the following: 1) how they adjust themselves when they do UR, 2) immediate and long-term benefits of UR experience, 3) reaction and the impact of things that they accomplished in UR (present posters, published papers and got awards/grants), 4) how helpful their UR experiences in their present occupation, and 5) their perspectives on the modified CURE courses that they experience. These

survey questions are listed below, with a summary of the responses to each from former student leaders of the mentor's research group.

Table 2. *Student respondents who shared their reflections*

Student	Major	Years in Group	Present Affiliation
Max Baria	Chemistry	2013-2015	L'Oreal
Kevin Symzcak	Chemistry	2014-2016	L'Oreal
Lexi Javornik	Forensic Science	2014-2017	Texas Department of Public Safety Crime Laboratory
Jahaira Zapata	Forensic Science	2016-2018	Office of Chief Medical Examiner, NYC
Jo Farshi	Biochemistry	2016-2019	dntl bar and graduate student in Public Health Nutrition at CUNY
Gwen Iannone	Chemistry	2017-2020	attending law school at UC Berkeley
Ally Papadelias	Forensic Science	2019-2021	recent graduate and planning to go to Veterinary Medicine

Findings

How well did the research mentoring environment work for you, and how long did it take for you to be comfortable in that environment?

Doing UR takes some adjustment period unless the students have prior experience in CURE courses or high school. Based on the responses from the students, most of them indicated that they are comfortable with the research mentoring environment, and it works quite well with them. For example, Max wrote, "Transitioning from academic learning to research lab-oriented focus was easy. As we addressed my strengths and weaknesses, I became more comfortable in the lab environment. I was able to grow and establish myself, and in 4-5 months, I was able to conduct tasks assigned to me and execute them with little help from my principal investigator (PI) due to being mentored on certain aspects of my research topic and theory."

Kevin wrote, "When I first joined the research group, I was a little nervous because it was my first time doing hands-on research, but the opportunities that this opened for me truly overtook my feelings. I felt more confident in doing research and experimenting on my own, even if some of my experiments didn't work. I felt very comfortable in this environment for a multitude of reasons. The research team, in general, was very easy and fun to work with." Jahaira wrote: "While I was new to the researching mentoring environment, I did not feel that the transition was overwhelming. I was first recruited to the group from a chemistry lab setting. I was able to use the skills acquired in this lab while completing my research" while Lexi and Jahaira both wrote, "I think the mentoring program worked great for me."."

On the other hand, Jo replied, "While I was new to the researching mentoring environment, I did not feel the transition was overwhelming," with Gwen saying, "I quickly become comfortable in the research environment as my mentor encouraged our research group to interact through group meetings and activities". Lastly, Ally wrote, "The research mentoring environment worked quite well for me and was something that I easily became comfortable with." The mentor (Dr. Mojica) and the group members played a very important role in how new members adapted to the new environment, as shown in the comments from Jo and Ally. Jo mentioned, "Everyone I was involved with was welcoming. Although most students were working on separate research projects, it was helpful to connect to other people who were going through a similar process." while Ally said, "The mentor and

the research group were very welcoming and made it known that help was always available without animosity."

When did you start to perceive the benefits of undergraduate research?

All the student co-authors agreed that their UR stint is of great benefit to them, with some giving them the opportunity to help with their present career. Max and Kevin, who are both now working in L'Oreal, felt the perceived benefits when they start doing presentations, as shown in Kevin's responses, "I started to perceive the benefits of the research when I first started presenting my work at University conferences, ACS meetings, and others." Other students began to perceive the benefits right away. For example, Jahaira said, "I felt the benefits of research from the very start," while Gwen mentioned, "I received benefits of student research almost immediately after beginning my first project sophomore year." Ally also commented, "I would say that I started to perceive the benefits of research as soon as I started." The same has been said by Lexi, "I started to see the benefits of doing research while I was still in classes." Lastly, Jo stated, "The benefits of research came on both a short and long term basis."

One of the reasons the students gave in recognizing the immediate benefits of UR can be summarized in a statement given by Jahaira who wrote "It gave me the opportunity to see what it would be like to spend a majority of the time in a lab working on projects and analyzing data. It gave me a look at what my future would look like and at that point decide if it were something I was going to enjoy or hate." This was agreed upon by Gwen, who wrote, "Student research allowed me to develop skills which I don't think I would have gained from required coursework alone and allowed me to apply class knowledge to research to have a greater understanding of certain subjects". Ally also added, "This is not to mention the advantage of completing undergraduate-level research write-ups and participating in presentations." For Lexi, the perceived benefit is increased confidence in the lab setting because "[she] was getting to spend the time on doing research outside of class and get some more hands-on experience with the instruments and the process." Jo also stated, "Having the experience in using some instruments also allows me to excel in other classes." She further summarized that one of the long-term benefits of UR is the "notion that job interviewers and graduate school programs sought interest in our research project."

What was your first reaction when you presented your poster, won an award, got a grant, and had a paper published?

Students expressed mixed emotions when they presented their poster for the first time. Max, Jahaira, Jo, and Gwen said they were nervous, while Lexi and Ally felt a mixture of excitement and nervousness. They were nervous because of the questions that may be asked to them during the presentation. As stated by Jahaira, "I was nervous about answering something wrong," which was also echoed by Jo, "I am nervous about what my peers or experienced scientists would ask me." Others attribute their nervousness to lack of confidence or fear in speaking in public. For example, Max said "I was not confident of my research topic the first time I presented a poster," while Gwen mentioned, "I have never been the biggest fan of public speaking." Ally also stated, "I was also nervous to present my research because of my fears of public speaking and my anticipation of the questions that might be asked of me" and "I was excited to experience UR for the first time and embark on this major accomplishment," which is agreed upon by Kevin who wrote, "Initially presenting a poster at the ACS conference made me feel accomplished because my research meant something."

All the student co-authors reported gaining a lot of experience during their first poster presentation. Some become less nervous by the next conference, like Jahaira said, "As we learned, that nervousness goes away pretty quickly." Some have an enjoyable experience, as mentioned by Ally, "I realized how enjoyable it was to speak on something you have put time and hard work into." Some

were able to connect with other people, like Kevin commented, “It was an experience to be able to attend the conference and connect with other students and scientists.” Some are proud not only of their accomplishments but their other groupmates like Jo “I was proud to see my research and the research conducted by other group members, evoking such thoughtful questions from other researchers.” Gwen summarized the overall experience in her statement, “I was pleasantly surprised to find that I really enjoyed sharing my work and findings with others. After the presentation, I felt a connection to those I had spoken with and a sense of pride for all of the work that had gone into the research project.” Overall, it was observed that all of them became passionate about doing more undergraduate research to present in succeeding conferences, applying for grants/awards, and publishing papers. Max stated, “Once I became confident, passionate, and more understanding of my research, I felt like I was becoming more of an academic researcher with knowledge in my field of study.” At the same time, Jo wrote, “My first conference gave me the confidence to apply for research grants and earn awards.”

On the other hand, they have different reactions in getting grants and awards or having a paper published. Max, who is the only group member to be an REU recipient, wrote, “I felt like my research meant something and I gained satisfaction of its impact on society when I began writing papers and winning awards.” Kevin wrote, “When I first received an award for a paper that I wrote, I was very proud of my accomplishment.” In contrast, Jahaira wrote, “The first reaction when winning an award, getting a grant, and having a paper published is a feeling of gratitude, satisfaction, and achievement. This is because you feel that other people care about your project and think it is just as important as you do. You also get a sense of achievement because all the hard work that you have put into that project is finally getting recognized.”

In addition, Jo was “grateful to have received several grants and awards,” while Gwen stated, “I felt confident in my abilities as a student researcher. I felt a similar sense of accomplishment and pride when I received awards and grants. These feelings encouraged me to continue down the science path and allowed me to gain faith in my ability to pursue a professional science job after college.” Lastly, Ally stated, “I was thrilled and felt very proud. I felt extremely grateful to be in the research group for all the wonderful opportunities opening up to me. I felt very appreciative of the awards given to me.”

What is the impact of exposing yourself in presenting papers and having publications?

Having discussed the perceived benefits of undergraduate research, most of them mentioned that exposing themselves in paper presentations and publications have a profound impact on their life. They gain confidence with every experience they get in presenting and having their work published, as expressed by Max, “The more experience you gain from presenting or having your work published in a research journal, the more confident you become in putting yourself out there to be the lead researcher in your field of study.” Kevin also indicated, “The presentation of the work that I have done has helped me feel more confident in presenting data, fielding questions, and getting other views on things that I did not notice during my research.” Similarly, Jahaira commented, “presenting papers and having publications helped me build self-confidence and this essentially helped me now gather my thoughts on the spot and discuss my data/results at work meetings.” This increase in confidence also makes them more comfortable at speaking in public, as mentioned by Lexi and Jahaira. Jo believed that aside from enhancing her communication skills, presentations also “provided exposure to a large audience who can provide numerous opportunities and valuable networking.” Gwen, on the other hand, said, “Poster presentation events not only allowed me to better my communication skills, gain confidence, and engage with others who were interested in my area of study, but they provided me the opportunity to learn from other researchers about their studies.” Lastly, Ally wrote, “presenting papers allows me to become more comfortable with things like public speaking, professional writing skills, and being confident in my work. The opportunities to

expose yourself through presentations or papers are extremely helpful when transitioning from college life to the professional world." In terms of publication, Jahaira added, "Publications are essential in showing other people, such as potential employers, the type of work that you have done and essentially what you are capable of achieving."

Is your experience helpful in your present job/occupation?

All of them agree that their undergraduate research experience is helpful to their present job or occupation. The experiences have helped them succeed in their career in many ways. Max stated, "With my experience, I feel like I know what to present and be prepared for meeting either with my team or various support groups within the company." Kevin mentioned, "I feel like I would not have been as prepared to start a career in the industry or feel confident in the work that I currently do if it were not for doing undergraduate research. This experience has definitely helped me with my career as well." The forensic science majors are thankful for the experiences, as Lexi wrote, "I have to testify in court, and having the practice of having to talk about my scientific findings at poster presentations and regular presentations has helped prepare me for that." Jahaira also added, "My research experience has proven helpful in my current job because it allowed me to gain hands-on experience on instruments that I continue to use today. My undergraduate research experience gave me a better understanding of how these instruments work and their ability to analyze samples."

For Jo, who is now working as a dental aide, the experience helps her "to explain complex procedures to patients." She added, "With the experience I acquired, I developed the ability to turn analytical research into terms that my peers, who did not have experience with using GC-MS (gas chromatography-mass spectrometry) or bee propolis, would be able to understand." After working in an environmental firm, Gwen, who is presently at law school, said, "The research projects I had prepared me with the skills needed for a professional role within environmental chemistry. The experience not only prepares me for law school by sharpening my analytical, communication, and research skills, but my environmental chemistry research background will allow me to have a comprehensive background when entering this area of law."

Based on their comments, the undergraduate research experience greatly impacted the students, especially when they exposed themselves to presentations and publications. Among the ten salient practices mentioned (Shanahan et al., 2015), the 10th practice of encouraging and guiding students to disseminate their findings is the one that has a lifelong and lasting effect. Since the students have presented more than once, they gained experience and knowledge in their research with every presentation, improving their speaking skills in public and increasing their network. These experiences also helped them grow to what they have become and prepared them for real life. These results confirmed the benefits of undergraduate research to students (Brownell et al., 2015; Hunter et al., 2007; Lopatto, 2007).

Do you think requiring students in a course like CHE 221 or CHE 331 to do research that are related to the experiments while taking the course will be helpful? Why or why not?

Finally, the last question was given to get feedback about making the CURE modified courses into full-time CURE courses. Lexi, Jahaira, Gwen, and Ally were required to take CHE 221 for Honors credit compared to others who opt for the research option. All of them agreed to require students to do research while taking these courses. Max commented, "I think doing research and experiments when taking classes, such as CHEM 221 and CHE 331, are essential to the material you are learning in the course and in the field itself. In a field such as STEM, it is better to have an understanding of both theory and practicality. Without the two, there would be no understanding of the world around us. Experiments take the theory you learn in class and give them a practical and reasonable approach. You learn quickly that not all theory is practical and that much of the science around us is based on either a good approximation of the knowledge at hand or the experience with certain

conditions that you have gained over a period of time." Kevin also commented, "I support the requirement for students to enroll in a course like CHE 221 or CHE 331 because it will positively impact them when they graduate. It gives firsthand experience as to what the real world is like, and helps relate to what we learn in the classroom and apply it in the lab. Being hands-on in the lab is where most of the experience is gained, especially in an industry like I am now. From my personal experience, I gained value from these courses, and I recommend students take these courses as they will benefit them in the future."

Taking these courses will also be helpful to the students based on comments from Lexi, "I think having the students do research while taking the course would be extremely helpful. The laboratory portion of a class is always very helpful. To have another opportunity on top of that to design your own experiments and analyze the data would be an excellent experience. The more a student gets to work with the instruments, the better." Jahaira also stated, "This experience could essentially help them in job interviews because they'll be able to show their vast knowledge based on how much experience they have." Jo wrote, "For students to complete research related to the experiments in the course will be helpful for them. This is an eye-opening opportunity for them to not only learn new instruments but also gain exposure to a new realm of research. I believe it will be helpful for the students to learn deeply from the experiments they are completing, regardless of their current research topic." Ally further explained, "I think that requiring students to enroll in CHE 221 or CHE 331 would be extremely beneficial to the students. Having to conduct research allows the students to grasp the coursework on a much deeper level. When doing research, you become an expert on your topic, which could help the students in the future."

Although Gwen agrees that "requiring students to participate in research projects related to coursework can lead to a better understanding of course material," she also cautioned that "these are demanding courses, and it is important to make sure that students can handle these additional research projects. In my opinion, the extra time and effort that will be expended should be accounted for by either updating the credit value of classes or reducing the workload in other areas of the courses." Jahaira also had the same warning, "I think this is a good idea for students who are 100% sure of what field they want to go into upon graduation because it will allow them to gain sufficient experience in an instrument that they will use in their future job. However, I do not think this is a good idea for students who aren't sure what area of chemistry they will end up in. This is because it will allow them to focus on one instrument instead of having ample time to use and work with all the different instruments available to them." Ally also added some caution on this idea of incorporating research requirement in CHE 221/331, "Research takes a lot of effort, and it would have to be organized in a manner that would be accomplishable for all students of varying backgrounds and experience levels." Using this feedback, CHE 221 will be a CURE course starting this Fall 2021. Students taking the course will analyze consumer products giving them the experience to gather data, interpret data and present the results in local conferences.

Summary and Conclusion

Students who served as leaders in the Mojica research group were asked to answer several questions and reflect on their undergraduate research experience. Those asked questions involved how the research environment worked for them and how they adjusted to it, the perceived benefits they got from UR, their reaction upon disseminating their results, the impacts of undergraduate research experience their present occupation, and their opinion on making modified CURE courses into CURE courses. Based on their feedback, all were positively impacted by their undergraduate research experience. Whether it was done during their modified-CURE courses or one-on-one stints with the mentor, their experiences have helped them prepare for the present career that they have right now. The paper also shows the successful adoption of the ten salient practices of mentoring undergraduate research in the structure of the involved research group. These practices helped

guide students to get the most out of undergraduate research. The students also gave their reflections on the 10th salient practice of undergraduate research mentors (i.e., encouraging and guiding students through disseminating their findings), especially the impact of exposing them outside the classroom by disseminating their findings. Presenting at conferences and writing articles published in journals have helped them enhance their communication skills and improve their knowledge on their research topic, giving them the opportunity to network with other people and boost their confidence. The experiences they gained in undergraduate research and the dissemination of their findings were also helpful when they transitioned to their professional settings. In terms of making full-time the modified CURE courses they have taken, most agreed that it would benefit students, especially those who are sure of their field of specialization.

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