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"It is just the diversity and variety that constitutes its charm; each flower, each tree, each fruit, beside being beautiful in itself, brings out by contrast the qualities of the others, and shows to advantage the special loveliness of each and all." -Abdu'l-Baha

Teaching Portfolio for consideration of the Excellence in Teaching Award

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UNIVERSITY OF GEORGIA

Franklin College of Arts & Sciences

Department of Plant Biology

Dear members of the selection committee, 1/26/2021

I am writing to nominate Rachel Perez-Udell's for the UGA graduate student Excellence in Teaching Award. Rachel is a PhD candidate in the Plant Biology department. Rachel is from an underrepresented group (Hispanic, first generation student) and has received a B.S. degree from University of North Georgia. Rachel's career aspiration is to become a professor in an undergraduate-focused institute similar to her *alma mater*. She is passionate about serving as a mentor and a role model for her students – particularly those with a similar under-represented background. With this goal in mind, Rachel started her teaching career early. She was hired as an undergraduate teaching assistant for several classes while still an undergraduate student at UNG. Her performance earned her the "Dr. Ralph E Hitt Student Assistant of the Year award" in 2017. In the 3.5 years at UGA, Rachel has vamped up her teaching effort and successfully built an amazing portfolio of accomplishment and initiatives in several courses where she served as an instructor of record. I will discuss further regarding Rachel's teaching excellence in this letter.

Since arriving UGA, Rachel has taught in many classes. She was an instructor for laboratory courses associated with introductory Biology and Plant Biology courses. She consistently received high marks in the course evaluations from her students, and also high praises from lab coordinators of these course (specifically, Ms. Kim Martin and Dr. Brigitte Bruns)! She has actively sought out opportunities to teach different courses so that she can gain a broad training on topics and teaching format such as laboratory, lecture, and online courses. Rachel has taught 6 semesters, and 4 different courses and her outstanding performance was recognized by the Outstanding Teaching Assistant Award from the UGA Center for Teaching and Learning in 2020.

In spring 2020, Rachel was granted a rare opportunity for a graduate student in Biology – teaching an entire undergraduate course as the instructor of record. Rachel was the sole instructor for the *PBIO3270 Flowers* course with 50 students enrolled. She did a phenomenal job! She successfully delivered the content of the course alone, skillfully captured students' attention using hands-on activities, and designed new and engaging teaching modules to help illustrate difficult concepts to students. Rachel's in-class instruction skills have attracted her former teacher's attention - in spring 2020, a professor from UNG joined Rachel's classroom to observe her teaching, intending to gain ideas for her home department's teaching strategy restructuring. Rachel rose to the challenge when COVID-19 pandemic forced a transition of the course into the online format in spring 2020! As part of this new class format, Rachel also successfully converted an in-class activity she developed and submitted it to the Capturing Science contest here at UGA. As the original instructor of this course, I can attest that Rachel did a beautiful job with this class and will continue to be a successful educator in the future!

With her outstanding track record in teaching, it is not surprising that Rachel was highly recommended by her teaching mentor, Dr. Brigitte Bruns, to serve as one of the two lead-TAs/Lab coordinators who oversee the Introductory Botany Laboratory course (PBIO 1210L) following Dr. Bruns' retirement in Dec 2020. In this leadership position, Rachel's responsibilities include training the GLAs for their classroom teaching, preparing materials for in-person classes, and organizing and conducting assessment for student learning. I want to point out that Rachel's teaching assignments described here, including being the sole instructor for a 50-student, 3000-level class and serving as a laboratory coordinator, are very unusual for graduate students in the STEM disciplines, where graduate students are

usually assigned to teaching the hands-on laboratory sections. Rachel's contribution to teaching at UGA are both outstanding and unusual.

Rachel's teaching excellence has also earned her recognition at the national level. She is one of the nine graduate students to receive the 2021 K. Patricia Cross Future Leaders Award by the American Association of Colleges & Universities (AACU). The selection committee commented that Rachel's "innovative approach to student learning, commitment to

equity, and contributions on and off campus" has made her stand out from nearly 200 applicants nationwide. With this award, Rachel was invited to participate and present in a panel discussion entitled "Graduate Students as leaders and changemakers: How commitments to learning, equity, and community will shape future faculty" held at the Association of American Colleges & Universities 2021 Annual Meeting (1/22/21). She has additionally enrolled in a MOOC (Massive Open Online Course) entitled "Advancing Learning through Evidenced-Based STEM Teaching" hosted by the CIRTL Network (to be held virtually on from January-March). These professional development activities will undoubtedly help Rachel to further enhance her pedagogical skills and prepare her for the goal of becoming a professor in higher education in Biology.

Beyond the University, Rachel has been actively involved in a wonderful science communication organization named Athens Science Café since 2018. She had served as the Art Director from 2018 to 2020 and was recently elected to be the director. As the director, she is actively promoting diversity through inviting speakers with diverse background that reflects our community. She also created a new pandemic-free format for the monthly talks that allow continuing dialogues between scientists and community members in a safe environment. Her effort to promote communicating science to the non-scientist members of the community is particularly important for encouraging evidence-based decisions that many of us are making on a daily basis!

In conclusion, I hope that I have made it clear to you that Rachel has made significant contribution to teaching that goes far beyond what is required of a typical graduate student. Her contribution and accomplishment in teaching is recognized by our department, by UGA, and by the national education organization. In addition to pursuing her scientific research, she has become an effective educator both in classrooms and at the interface between science and society. Her passion in engaging her students, and her audience, both scientists and non-scientists, in discussing important society issues related to science will most certainly continue after she finishes her degree at UGA. I truly believe that Rachel is an ideal candidate for the UGA Graduate Student Excellence in Teaching Award and hope that you agree.

Sincerely,

Shu-Mei Chang

Professor, Plant Biology Department

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Nominee Statement

My goal is to one day teach at a primarily undergraduate university once I complete my PhD. Over the past few years, I have cultivated the necessary skills to become an effective educator, mentor, and leader so that I may support others in their academic endeavors.

I began my education journey when offered a TA position sophomore year. My responsibilities included grading, setting up, managing lab equipment and specimens, the overview of lab practical exams, as well as helping students with their experiments. I TAed freshman biology, stream ecology, vertebrate zoology and animal physiology. I won the Dr. Ralph E Hitt Student Assistant Award for my TA efforts. This experience guided me on a track to pursue higher education as a career.

At UGA, I continued my TA journey through lab, lecture, online and hybrid courses. Most notably, my deptartment selected me to be Instructor of Record for PBIO 3270 Flowers. I tested the waters with the pedagogy I had been developing that favors a hands on, active learning approach to teaching. With the course already built around that premise, I created new material to add to the course, changed/updated rubrics and the syllabus. For example, I developed an interactive game to teach pollination syndromes (characteristics of plants and pollinators that encourage pollination) called "Pollinator Speed Dating." In this game students are broken into two groups: flowers and pollinators. They are given information about their pollinator or flower and tasked with finding their 'perfect match' through a quick speed dating game. I was invited to present my activity to a section of GRSC 7770 during their active learning module. After Flowers, I redesigned this activity into an interactive computer game in response to COVID-19 classroom guidelines. Creative use of linked slides on PowerPoint allows the students to explore the characteristics of flowers and pollinators regarding pollination syndromes without the in-person component, which permits its use in virtual classrooms. Aside from content, I altered the testing format of the course.

As a student, I disliked getting tests back with wrong answers. Too often, students are told they are wrong but never given the opportunity to learn from the mistake. The exam is forgotten, new material is begun, but without filling in gaps of knowledge. A proper education should not be a single chance to nail material. After handing back the first Flowers exam, I created a worksheet based on their incorrect answers as a 2nd chance to revisit content. Students were encouraged to work together on this worksheet. I wanted a group dynamic so students could teach each other. When faced with an incorrect answer, students should work together as a group to resolve the problem, question their thoughts on the material, and make new assessments towards another answer. Learning doesn't stop at an assessment. We need to give students a chance to reassess their thoughts and come to new conclusions!

During my time as instructor of record of Flowers in Spring 2020, UGA shut down in response to COVID-19. Suddenly my first time overseeing a course radically and unpredictably changed. I ended up getting a two-for-one special in regards with how to teach, because I needed to quickly switch my delivery to an online format!

I have since won an Outstanding Teaching Assistant Award, and the K Patricia Cross Future Leaders Award and plan to contiune my teaching journey. Each semester offers more practice in effective communication, content delivery, and interacting with students. To supplement my teaching abilities and pedagogy, I have attended various workshops and taken a variety of courses. Most recently, however, a new experience presented itself to me. Our lab coordinator, Dr. Bruns, retired at the end of 2020. My department asked me and another student to step up into her role while a search was carried out. This role, as described by the job description, is for someone, "who demonstrate[s] a commitment to excellence in instruction" and "…develop[s] a clear and creative vision for the management of an introductory plant biology laboratory instructional program". My duties in this role far exceed the typical duties seen by a graduate student. I'm managing GLAs, students and a 190-student laboratory.

I believe that education extends out past the walls of University. Science can be a frustrating and difficult topic, which is why scientists should engage with the community with effective science communication! I joined an organization called the Athens Science Café during my first year as a graduate student. We organized monthly science talks with a diverse assemble of invited speakers. We encouraged the talk to be half lecture and half conversation with the community. I am the current program director for this organization. To practice what I preach about community engagement and education, I have been invited to give a talk by the Georgia Museum of Natural History to the community on my research in geographic variation of floral pigmentation in *Geranium maculatum* this March. I will focus my talk on the work I've done using iNaturalist.org, a citizen scientist website. I will encourage attendees that they too can influence science by joining the thousands of naturalists that post observations to iNaturalist.

To engage in one-on-one teaching skills, I have been developing my mentorship abilities. I received my first taste of mentoring as an Honors program mentor in undergrad. At UGA, I acted a mentor to e undergraduate students in scientific research. In the future, when I hopefully attain professorship at a small undergraduate university, I will utilize the skills I have learned in undergraduate and graduate school to become an effective instructor. I will structure my courses to present an engaged, inquiry-based active learning approach that affords students opportunities to reassess their knowledge throughout the semester.

Teaching Philosophy

"The relationship between tutor and the other participants is not one of teacher-to-student; all are consciously engaged in a process in which everyone is seeking to learn. But the tutor is not a detached and passive facilitator of discussion either. Having completed a sufficient number of courses in the sequence and undertaken the acts of service they encourage, he or she is able to assist every member of the group in achieving the purpose of the material being studied" – Ruhi Institute, Reflections on the Life of the Spirit

Education is a group effort between teacher and student. Because we now know that lecturing into the abyss does not effectively transfer of knowledge, our role as instructors must find creative, *active* approaches to student learning. I firmly believe that when I enter the classroom, I am not *the* expert (That's preposterous. There are gaps in everyone's knowledge!), but I do know that in the classroom I *am* a facilitator, helper, and a resource. Even though my role is to 'teach', I come out every semester having learned something new from my students, making me a student, too.

Over my years at UGA, I have began to understand two important concepts which either permeate my current roles and will follow when creating my own future courses.

The first is awareness, on which I am still working and educating myself. I come from a background of mental health issues (Panic Disorder, OCD, ADHD). I *really* struggled in high school. I did not know how to advocate for myself or ask for accommodations or *help*. Thankfully, I am now functional, however, I realize that students fight their own battles. Each student only has so much bandwidth and, especially with that pandemic, external conflict of all kinds may eat up their limited source. In response, I try to offer more accommodations to students, give ways for students to make up points, and give lesser penalties for being late. When I finally reach professorship, I want to implement a no questions asked coupon for assignment extensions. All students get a set number of coupons as well as a free attendance mental health day off.

Along with awareness, the concept of equity has set into my thoughts. I recently began thinking about equity issues that could impact a student's bandwidth. For example, I do not require cameras on in zoom calls. I realize students may feel ashamed or uncomfortable about their backgrounds visible, whether at home or otherwise, and how their peers would perceive them. I no longer cold call on students as such an intrusion may hurt their sense of belonging and bring on feelings of uncertainty or inadequacy. Instead, I focus on discussions and group work. If necessary, I'll create an eLC discussion thread for anonymous questions. In addition, I want to teach no cost courses as to not set up another educational barrier for financially unstable students. I try to learn about students and attempt to build a connection with everyone, by something as simple as asking them about themselves and their goals. In response, I have begun revaluating my own materials. For example, I realized that my pollinator game presented issues to color blind students, so I changed the flower cards to include the written color of the flower along with a photograph.

I believe activities should be done in a group setting. Because collaboration remains an effective way for students to assimilate knowledge, I love peer instruction: group projects, discussions, labs, worksheets, and *exams*. We must realize that no one lives on their own little island. The world functions off collaboration and should be no different in the classroom. I recall my first apparent classroom experience of this philosophy in undergraduate genetics. In this course, we were given a multiple-choice exam to take individually. After completion, we were broken into random groups where we retook the exam using an IF-AT form. This form, when scratched, would immediately indicate an incorrect answer. When faced with our mistake, we had to work together as a group to resolve the problem, question our thoughts on the material, and make new assessments towards another answer. I implemented something similar as instructor record of Flowers. I hope to do more testing like this.

The collaboration aspect is one of the reasons lab courses are my favorite to teach. Furthermore, labs present a great way to use inquiry-based learning and climb up on Bloom's Taxonomy. I never experienced a 'flipped classroom,' but I image labs as similar. Students read an introduction outside of the lab and take a short assessment. When they come into lab, they receive a brief introduction lecture paired with a showcase of how to use any equipment. Students are then posed with a problem or question they need to answer using the tools and materials at their disposable. We see students pull various concepts and techniques together to come to some realization on a topic through hands on, guided inquiry-based learning. To further that point, I engage in research with undergraduates, because I believe it offers a high impact practice of extreme importance. Looking back at my own undergrad research experience, I learned how to question, analyze data, synthesize information, critically think, and be more curious and creative.

At the core foundation of all these beliefs, giving students a sense of belonging (to recover that bandwidth!), engagement, a sense of wonder for the world around them and a new appreciation for a topic is held in the highest esteem. I know that I will be a life-long student as educators must continuously work and refine their methods. With each new set of skills I gain, I aim to not only grow myself, but grow my students as well. Afterall, we're all in this together.

Courses Taught

BIOL 1107: Principles of Biology 1 Lab
Role: Graduate Lab Assistant
Semesters Taught: Spring 2018, Fall 2018 (2 sections each)
Student Profile: Between 22-24 Biology undergraduates each section
Course Description: This is an introductory biology lab geared towards first year biology majors. Core concepts of molecular and cellular biology are taught in the main course and assimilated with a hands-on inquiry-based approach in the lab. Students are guided to use the Scientific Method to complete various lab experiments, ranging from how light color influences photosynthesis to how enzymes work. Basic lab skills are taught including microscopy, pipetting, DNA extractions and PCR. This course is considered writing intensive and students were shown how to conduct a scientific literature search and how to compile and synthesize information from primary literature as well as their own experiments.
How I fit in: Each class period I gave a mini lecture on the day's activities. I demonstrated the lab to students and showed how equipment worked. When students came with questions, I attempted to guide them to the anwsers by the Socratic method. When I noticed students struggling with concepts, such as how to convert measurements with the metric system or how to write an introduction, I followed up the next class with a short '5-minute' teach. At the end of class, or during quiet lulls in experiments I often guided students to answer questions about what we were doing and why and the results they derived. Additionally, I graded all student work.

PBIO 3270: Flowers
Role: Graduate Teaching Assistant (Spring 2019), Instructor of Record (Spring 2020)
Semesters Taught: Spring 2019, Spring 2020
Student Profile: Approximately 50 upper-level biology related students
Course Description: Flowers! Without them, we would have very little food, no honey and not a single butterfly or bee. This course takes the topics of ecology, genetics, and evolution to dive down into an integral life form, the flowering plants. This course is for upper level biology/plant biology/ecology/genetics/science majors. The course starts broadly with 'What is a flower?' However, the question (and answer) isn't so simple. At their core, flowers are a reproductive structure. They are filled with much diversity, but why and how? How does this diversity impact how pollination (a vital process for getting fruits!) happen? Students will learn about various sexual systems, pollinators, ecology, habitats, and genetics interact to see what makes a flower, a flower.
How I fit in: In Spring of 2019 I was the TA for this course. I would ready materials for the day as this course typically had at least one hands-on activity a day. These activities may need flowers, worksheets, or even pipe cleaners! During class, I would sit in and move around the room during the frequent class discussions and activities to help aid students. I took care of all the grading and held office hours for content. I proctored both exams and helped edit them beforehand. I took vigorous notes of the course and what seemed to confuse or really work for students as I was told there *may* be the need for me to take over the course in the next year. The next year, Spring 2020, I did take over the course. I was given free reign to adjust the course to how I saw fit. I kept all the core content and concepts the same, but adjusted activities, testing and the syllabus. I even created a few new activities! I was provided a TA to aid me with the same duties I previously had done. I ran lectures, guided activities, and when COVID-19 struck and shut down the University, I pivoted online and adjusted the course (including projects, the final exam, activities, and due dates) the best I could as someone with very little online instructing experience at the time!

PBIO2500E: Natural History of GA plants
Role: Graduate Teaching Assistant
Semesters Taught: Fall 2019
Student Profile: 28 non-science majors, online
Course Description: This is a fully online course for non-science majors. Students can be in any level of their undergraduate coursework to take this course. This course looks at the various 'ecoregions' of GA, including the piedmont, blue ridge, coastal plains and others. Students learn about local ecosystems with an emphasis on plant life, and conservation. The course is topped off with students presenting 'virtual hikes' of a chosen location in GA that encompasses climate and geology, vegetation, and human impacts.
How I fit in: I felt as if my role in this course was more managerial towards the students. I uploaded resources and documents to eLC, edited assignment postings, and kept the general upkeep of our 'virtual classroom'. I interacted with students mostly through written correspondence. I graded assignments and gave feedback for each 'profile' they turned in every few weeks in the semester that built up into their final project, the virtual hike.

PBIO1210L: Principles of Plant Biology Lab (hybrid virtual/face-to-face)
Role: Graduate Lab Assistant (Fall 2020), Co-Lab Coordinator (Current)
Semesters Taught: Fall 2020, Spring 2021
Student Profile: 24 non-science majors (Fall 2020), approx. 190 non-science majors (Spring 2021)
Course: Description: This is an introductory science lab for non-science majors. Students may be in any level of their undergraduate education, but we commonly instruct freshman students. Core concepts of plant biology, including photosynthesis, cell biology, physiology, are taught in the main course and assimilated with a hands-on inquiry-based approach in the lab. Students are guided to use the Scientific Method to complete various lab experiments ranging from how plants pass down traits to how various environmental conditions can influence plant transpiration. Basic lab skills are taught including microscopy, tissue discussions and slide mounting.
How I fit in: In my very first term as a GLA for this lab, I helped the now retired lab coordinator plan the course to be hybrid. I even created one of our virtual lab activities, Pollinator Speed Dating, from the face-to-face activity I created for Flowers. I was put in charge of 2 sections of the lab. My role here was much like my role in 1107L, except now we threw in the asynchronous hybrid portion. Effectively each week I guided students through two different labs (one virtual, one face-to-face). My virtual instruction relied on my pre-recorded Zoom sessions where I gave an introduction, went over the pre-lab, and guided students through the activity. After Dr. Bruns retired at the end of 2020, I and another student took over her role as lab coordinator. We oversee 8 sections of the lab and 4 GLAs. We have set expectations for the GLAs, and each week we send notes and materials to them and run a GLA preparation session for both the online and face-to-face portion of the course. In addition, we review and edit assignments, create grading rubrics, create new online assignments, set up the lab, and coordinate with the greenhouse and care for living specimens.

Teaching Work Examples

Sample 1: Pollinator Syndromes: To evaluate students' grasp on the concept of pollinator syndromes, an evolutionary phenomenon where characteristics of plants influence the types of pollinators that visit, I used a multiple step approach.

Step 1: Introduction through peer instruction. Students were broken into small groups. One half the group was given a "Flower" card and one half the group was given a "Pollinator" card. In a 'speed dating' fashion, students were paired off to discuss their cards (one flower to one potential pollinator) and how they could interact. Cards had various characteristics, such as a flower being yellow and a certain pollinator being attracted to yellow. Students were tasked with finding their ideal match.

Step 2: Discussion. At the end of the activity, students were told to find their ideal match. In some cases, there was more than one potential pollinator for a plant. A class discussion was conducted on how they found their match and why some plants found more than one potential match (a generalist vs specialist stagey).

Step 3: Reflection and sharing. Students were then grouped and tasked with picking a pollinator and creating a short three-minute presentation on the pollinator syndrome, it's ecological importance, and what the impacts were to be if it disappeared.

Step 4: Testing. I wrote an open-ended question (below) for our first exam that relies on students grasping the concept of pollinator syndromes. The question allows for a bit of creativity as the plant can be farcical and students are not penalized if they are unable to recall *every single* characteristic of each syndrome due to the open nature of the question and not quizzing them on one specific syndrome. However, the question does rely on some recall, but still utilizes creative thinking. For example, if the potential pollinator were a bat, then deductively, the plant must be robust. Given the nature of bats to be active at night, students could deduce that color may not be very important in the dark.

"You are creating a new world. You have the ability to create a new flowering plant that must adhere to Earth's pollination syndromes. Describe to us your flowering plant in terms of **rewards, shape, color, scent and time of bloom (day or night)**.You may draw pictures. Based on what we learned in class, what would be the most likely pollinator(s)?"

Sample 2: Phylogeny Misconceptions Activity

After my time as the TA for Flowers, I noticed students held many misconceptions on evolution and the concept of 'tree thinking.' I created a class discussion activity to confront these misconceptions, using prompts from Dr. Stacey Smith's, a professor of evolution, blog post, found here: http://for-the-love-of-trees.blogspot.com/2016/09/the-ancestors-are-not-among-us.html

Example of the two slips for one group. (All wording is taken directly from the website):

> Misconception: Basal lineages sit at the base of the tree or at the bottom of the tree diagram

Truth: The observation that certain lineages are near the bottom of a tree does not reflect any aspect of evolutionary history; it is simply a reflection of the choices made in drawing the tree

Step 1: Group discussion: In the classroom, there are 8 tables. We made 4 pairs of 2 tables. Each pair would receive a slip of paper with a misconception and a truth. Students are encouraged to talk within their group about their slip of paper. Some questions to begin with are 'Is this the misconception or truth?' and 'What are your thoughts on the topic?'

Step 2: Growing the discussion Bring the matching misconception and truth groups together. Allow them to discuss their table's thoughts. Together they are tasked with deciding which table has the truth and which has the misconception.

Step 3: Reveal: Each of the 4 groups has a representative present the two slips of paper and what their group's conclusion was and why. The room was then opened to a general discussion with all the class involved.

Step 4: Reflection. Students are given the blog posting and encouraged to read the article.

Innovative Teaching Project

Project 1: Study Assignment. PBIO 3720 Flowers. Study guides can be a great tool for students to focus their efforts. However, what makes a study guide effective? I wanted to use a bank of questions to help students with the concepts and content *they* struggled the most to understand. Before the first exam in Flowers, I tasked students with a Ticket Out the Door task to write a question that they did not know, but reasonably thought may appear on the exam. I collected all the questions, sorted and posted them in a discussion on eLC with the directive, "For this assignment, you will be answering 2 of your peers' questions. Why? I want you to understand that science (and much of life) is collaborative. Sometimes you need help to understand something. I also believe that teaching someone else a topic is a great way to study. My hope is that you'll find the holes in your own knowledge as you read these questions and think, 'uh, I ...may not know the full answer to that.' Additionally, you can answer questions and prep for the exam! So, helping your peers out + studying! In your post, write down the question from the list you are attempting to answer, your answer and how you found the answer (aka: why should we believe you? This can be accomplished by giving sources to websites, or directions to the material in a class exercise or PowerPoint slide.)"

For the exam, I included a few of these questions, to encourage students to take this assignment seriously and try their best.

Question example: What would a flower look like if the B gene is not expressed?

Student Response: If a flower does not express the B gene, then it will have two swirls of sepals and two swirls of carpels because these are independent on the A gene and C gene respectively. In order to have petals, the A gene and B gene need to be expressed together, and in order to have stamens, the B gene and C gene need to be expressed together. Without the expression of the B gene, there would be no petals or stamen. Source: The making of a flower lecture notes slide 14

Project 2. Exam Re-Do with a Group. I personally never liked the idea of taking an exam, getting a mark, and moving on. When I was instructor of record for Flowers I decided to change the face-to-face teaching strategy a bit. The students took an individual exam in a 1 hour and 15-minute block. The exam was a mixture of short answer, true/false and multiple choice. After my TA graded the exams, I examined the most frequently missed questions and wrote up a worksheet with new questions. The following class period, I gave students their exams to review and then I gave the students the (optional) worksheet to complete with a group of their choosing. There was no limit to who could be in a group. The worksheet was worth enough to promote them an entire letter grade on their exam. My thought was that students would use peer instruction to resolve their misconceptions and learn while being assessed, as well as being granted clemency for showing improvement.

Exam Question: Double fertilization is an important process in angiosperms. It can be divided into 3 steps. (4 pts)

- Pollen/ovule production
- Pollen tube growth
- Double fertilization

Double fertilization requires two sperm cells. What are the two structures that are fertilized by each sperm? What is formed by each fertilization event and its resulting ploidy?

Structures: _____ Ploidy: _____

Structures: _____ Ploidy: _____

Worksheet Question: 1. Explain the process of double fertilization in angiosperms. Start from when a pollen grain lands on the stigmatic surface and end with the creation of a seed.
Make sure to include the key cellular structures of a pollen grain and ovule, including how the sperm cells reach the ovule and what gets fertilized.
This answer should be detailed and include the different parts of a pollen grain and how they interact. (5 points)

Sample Student Work

Sample 1: Virtual lab activity for PBIO 1210L, Reproduction Lab. In this lab, activity 3 deals with pollination syndromes. I created a game to be played on PowerPoint using linked slides and buttons to explore the concept and give interactive examples of pollinator syndromes. Prior in the lab, students went outside and found 3 flowers of their choosing (or if they were unable to go outside or felt unsafe due to COVID-19 they could use sources such as iNatualist.org or a virtual herbarium to find flowers) for dissection and labeling. After my activity, students were tasked with deciding which pollinator best matched their flowers.

3.2: Determine possible pollinators of your three flowers
Using the information, you just explored, make a reasonable guess at the pollinator for each of your chosen flowers.
You may use the Pollinator Speed Dating game PowerPoint and the chart you filled out in the previous activity to aid you.

1. A possible pollinator for the China Rose is the butterfly because if its bright colors and wide petals

2. A possible pollinator for the Hammerleaf Frangipani is the moth because this flower was open at night, it had a very faint scent and moths also prefer dull colors like white.

3. Possible pollinators for the Purple Allamanda are bees and butterflies because if it's bright colors and wide petals providing a landing platform.

Sample 2: Ecology profile for PBIO2500E. Students created short 'profiles', informal write ups, regarding research they did at a chosen Georgia site for various topics, including ecology, that would later become a 'stop' on their semester virtual hike. This project was not created by me, however, my feedback helped students cultivate their work into a final project. For this profile, the student was tasked with writing about at least 2 ecological processes and how it impacts the ecosystem as why as how to identify the process.

Ecology Profile

My project site is the Rock & Shoals Outcrop Natural Area in the southern part of Athens-Clarke County, near the Oconee County border.

Since the gneiss outcrop is largely exposed, it gets extremely hot, sometimes as much as 120ºF in the summer. I expect that the lichens and mosses on the outcrops have adapted accordingly, mostly by shriveling in extreme heat and unfurling when temperatures decrease. I think resurrection ferns and mosses are common in the area. I also expect to see some fire-adapted species in the area, since fire disturbances are common (and often necessary) in southeastern forest ecosystems.

I don't expect to see much out of the ordinary when it comes to herbivores or plant diseases. From what I've researched, the ecosystem seems fairly healthy, except for human impacts (more on that later). The herbivorous species in the area are all common in southeastern forests – birds, squirrels, deer, etc. I would be interested to see if the deer impact on the vegetation is higher, lower or about average for similar ecosystems.

As far as mutualisms go, I learned something interesting – there is a species of succulent endemic to granite outcrops in the Southeast, *Diamorpha smallii*, whose primary pollinator is ants, rather than bees. I expect to see this relationship at Rock & Shoals, though whether it's true mutualism is hard to say – this study suggests that more research is needed to tell whether ant pollination is beneficial or detrimental to *Diamorpha* populations.

The area that is now Rock & Shoals was once farmed for cotton; the terracing is still visible in some parts of the area. As such, I expect to see succession that has progressed about 100 years. I think Eastern red cedar and sweetgum are common in the area, but not the larger deciduous trees that an older forest would support.

Rubric
Excellent: Description of ecological concepts are accurate, well-written in common language, and appropriate to the chosen site. Student shows thorough understanding of the ecological process in both how it impacts ecosystems as well as how to identify it in the site. 16-20 pts.

Good: One of the ecological processes described is SOMEWHAT lacking in precision, accuracy, or clarity. Student shows adequate but not thorough understanding of the process. 11-15 pts.

Fair: At least one of the ecological processes described is SUBSTANTIALLY lacking in precision, accuracy, or clarity. Student shows adequate but not thorough understanding of the process. 6-10 pts.

Poor: Both ecological processes described are substantially lacking in precision, accuracy, or clarity. Student shows little to no understanding of how the process impacts ecosystems or how to identify it in the site. 5 or less points.

Feedback to student: Citations? Please remember to define the ecological processes you are talking about! What is mutualism? What is succession? However, kudos to finding a scientific article! 15/20

After all profiles were written and graded, students were tasked with creating a virtual hike through their site with 10 'stops' relating to the profiles they had previously compiled. Drafts were anonymously peer reviewed before the final submission was due.

Peer feedback from another student on a draft of the final project: I really appreciated the simplicity and organization of this project. All of the necessary information was given and pictures taken by the author gave visuals to said information. I also liked the length and depth of the paper; there was plenty of information to allow for readers to understand the meaning of each station, but it was not overly wordy or complicated. The only criticism I can offer is to maybe add some creativity to the project! Even just changing fonts or colors could make it a bit more visually interesting.

On the final project the student received a 97/100 and wrote a beautiful ecology stop about ant pollination and another about fire disturbances.

Professional Development and Training

Awards

- University of Georgia Outstanding Teaching Assistant Award (2020)
- University of North Georgia Dr. Ralph E. Hitt Student Assistant Award (2016-2017)
- Association of American Colleges & Universities (AAC&U) K. Patricia Cross Future Leaders Award (2021)

Workshops/Conferences Attended

- Preparing to Apply to Teach in Higher Ed, Center for Teaching and Learning, UGA, Sept 2020
- Effective and Efficient Grading Strategies, Center for Teaching and Learning, UGA, Sept 2020
- Bring an Inclusive Mindset to Your Teaching, Center for the Integration of Research, Teaching and Learning, Sept 2020
- Overview of High-Impact Practices, Taxonomies, and Assessment, Center for the Integration of Research, Teaching and Learning, Oct 2020
- Revolutionizing Higher Education After Covid-19, AAC&U Annual Meeting, Jan 20-22 21
- *Registered to attend:* Metacognition: Helping Students Navigate the Landscape of Learning, Center for Teaching and learning, UGA, Feb 2021

Invited Talk/Panelist

Invited lecture, Active Learning Example: Pollinator Speed Dating. Spring 2020

- Invited to give a presentation regarding active learning strategies to graduate students teaching/laboratory assistants enrolled in GRSC 7770, Graduate Teaching Seminar
- Demonstrated my Pollinator Speed Dating game as an example of an active learning approach

Panelist, Graduate students as Leaders and Changemakers: How Commitments to Learning Equity, and Community will Shape Future Faculty, AAC&U Annual Meeting 2021

- 1 hour panel with the other Cross Scholars

Pedagogical Coursework

- GRSC 7770: Graduate Seminar on Teaching (3 credit hours) Fall 2017
- WIPP 7001: Pedagogy of WID (1 credit hour) Fall 2017
- PBIO 8010: Seminar in Teaching Biology (1 credit hour) Spring 2019
- Advancing Learning Through Evidence-Based STEM Teaching (no credits), Massive Open Online Course via the Center for the Integration of Research, Teaching and Learning. *Currently taking.*

Community Engagement

- Science Olympiad, Forensics Supervisor (regional), 2014-2016
    - Developed crime scenario and implemented forensics tests for a state high school level competition of 24 teams at the regional level
- Program Director, Athens Science Café, June 2020-Current
    - Promoted our mission statement to facilitate a dialogue between scientists and the community in a new online format as a COVID19 response
- Art Director, Athens Science Café, Nov 2018-June 2020
    - Created promotional flyers for free monthly seminar series used to encourage science communication to a broader audience through various topics
- Science Fair Judge, Oconee County, 2017-2020
    - Accessed middle-high school science fair projects

Mentorship (in undergraduate research)

- Amy Lin. Biology Undergraduate student. Summer 2019-Fall 2019
- Emma Horne. Plant Biology Undergraduate Student. Spring 2020, Fall 2020-Current
- Mackenzi Costley. Biology Undergraduate Student. Spring 2020, Fall 2020-Current

Teaching evaluations

BIOL 1107: Principles of Biology 1 Lab	Spring 2018 Average	Fall 2018 Average
Regularly prepared for class	4.1	4.7
Made good use of class time	3.6	4.5
Presented material in clear and interesting way	3.7	4.3
Willing to help students	4.2	4.6
Stimulated interested in the course	3.5	4
Graded fairly	3.5	4.1
Overall rating	3.6	4.3

"She was always ready to provide feedback for written assignments and never hesitated to provide help when students had trouble understanding the material."

"Rachel was always willing to help us in any way she could. She was always fair and easy to come to if you had a question. The course in general was tough because of the writing intensive nature of it"

"She was great at explaining things, and she always tried to make class go by fast even though it was quite long, as well as making them interesting."

"She was awesome, very clear and understanding, one of the best TA'S. She deserves to teach more classes and get more leadership roles. She is the kind of person and perspective we want setting up the department."

"She was a really good TA and made the most of each lab, even if the instructions in the lab manual weren't clear or if the lab had problems. She's a really relaxed person and made lab a lot less stressful"

PBIO3270 Flowers	Spring 2020
Regularly prepared for class	4.2
Made good use of class time	3.5
Communicates clearly and effectively	3.9
Enthusiastic about the class material	4.7
Willing to help students	4.3
Stimulates student's interest	3.5
Grading policy is fair	4
Encourages students to think for themselves	4.1
Overall rating	4.1

*I was mistakenly not included on the evaluation for Spring 2019 when I was the TA. These evaluations reflect my time as IOR.

"I really enjoyed the discussions that we had in class and enjoyed the specific discussion sections with the primary literature. I think it really helped me learn how to read such dense material and taught me ways to focus on the important ideas of the paper, rather than getting lost in the details. Thank you for an amazing semester!"

"Rachel is super passionate about flowers and she definitely knows what she is talking about. I really enjoyed her positivity and creativity when coming up with activities to help us learn. Many times she would devote time into making tangible examples(when we were physically in class) and I thought this really helped me as I am a hands on learner."

"She comes to class prepared and on time. She also takes the time to make sure we understand the material before moving on, which is really nice because I am able to make sure I don't leave class unsure of the material I learned that day."

"There were several things that Rachel did well in this course. The most helpful was providing us learning objectives to focus on and explaining what each objective meant if it was unclear. She was also very passionate about what she was teaching and never hesitated to answer questions. She would also stay behind after class to answer questions for those of us who were too shy to ask during lecture. The worksheets and group activities that we did in class helped us think critically and apply what we learned in lecture to understand the material at a deeper level. Once we shifted online, I really appreciated how flexible Rachel became with the course work and with some of the deadlines."

"WOW! She has been the most caring professor to date! She really wants us to learn regardless of what our major is. She inspires me to work hard in the course and she is always willing to explain concepts in a comprehensive manner if I don't understand.

PBIO2500E: Natural History of GA plants	Fall 2019
Regularly prepared for class	4.3
Made good use of class time	4.3
Communicates clearly and effectively	4.3
Enthusiastic about the class material	4.5
Willing to help students	4.7
Stimulates student's interest	4.7
Grading policy is fair	4.3
Encourages students to think for themselves	4.7
Overall rating	4.7

"Individual feedback was given on most assignments turned in to be able to better understand how to improve the next time."

"Rachel, I wanted to reach out and thank you for your thoughtful comments in the feedback section of our grades. I have not responded but will try to address the questions or expand a bit more in my final paper. I also appreciate your comments regarding the government regulating private ownership of land. I didn't realize how controversial it could be. So much to think about. I love it :) Again, thanks for helping highlight the topics I need to focus on in my paper, it helps."

One thing the instructor does well is…

"is letting us know what is expected of us."

"Prepare videos and gives resources for quizzes."

PBIO1210L: Principles of Plant Biology Lab	Fall 2020 Average
Regularly prepared for class	4.3
Made good use of class time	4.3
Communicates clearly and effectively	3.7
Enthusiastic about the class material	4.3
Willing to help students	3.9
Stimulates student's interest	3.9
Grading policy is fair	3.7
Encourages students to think for themselves	4.2
Overall rating	4.4

"getting her students excited about the material because her excitement and love for the material was contagious."

"You were an incredible TA! Never stop perusing and sharing your passions!"

"Make sure each student is ready and informed sufficiently for each assignment. Pre Lab videos were very helpful being that we were not allowed to meet face to face. Making labs interactive even from the computer was really helpful towards my learning. Her teaching style is fit for my style of learning so I was able to takeaway a lot from this Lab.

"Work well with the circumstances to ensure that each student is receiving material during COVID-19 circumstances."

"I like that instead of just marking off points on labs, she will explain why she marked off the points."

"When the labs were face-to-face, the instructor was great at showing how to complete the activities and explaining what would happen when doing those activities"

Further evaluation from a recently retired faculty member.

Brigitte U. Bruns, PhD January 22nd, 2021

Dear 'Excellence in Teaching' award committee members:

I am delighted to write in support of Rachel Perez-Udell's nomination to receive the **'Excellence in Teaching' award.**

Rachel's contributions to science education in the Plant Biology Department and the Biology division are highly valued, as shown by the 'outstanding teaching assistant' award, she received recently. It is my opinion that she clearly deserves the recognition through the top teaching award for graduate students. She clearly takes on responsibilities far beyond expectations for a GLA.

She has successfully taught an amazing variety of undergraduate Plant Biology and Biology lecture and lab courses. She also contributed to the design of established face-to-face, and the creation of new remote, and hybrid instruction courses.

When I met Rachel in 2017 at a graduate student recruitment event, she was unusually and outstandingly engaging, and passionately interested in teaching and learning. Over the years I paid attention to her professional development and can now emphatically confirm, that Rachel is an extraordinary creative and skilled educator. Her lively, and passionate instruction style awakens freshmen and advanced students alike.

Last fall, I finally had the pleasure to work closely with her. Rachel was assigned to teach sections of my introductory 'Principles of Plant Biology' laboratory course for non-science majors. She had stopped by the teaching lab several times before her assignment and was very interested in the course. However, because of the pandemic, our actual idea exchanges centered on how to implement substantial changes for face-to-face and virtual PBIO1210L lab instruction, while keeping up curiosity and engagement of non-science majors. In typical Rachel manner, she got passionately involved in preparing for a COVID pandemic fall semester, long before the semester started. Anticipating the complications of offering hybrid lab instruction, she volunteered to work with me on creating tailored virtual labs to match the active hands-on labs we had been offering in pre-COVID times. With her input, we redesigned the face-to-face instruction and developed a new virtual equivalent to the labs to be attended in person. Students were assigned to A or B group, alternating by week to study the same content, taught in the two instruction modi. Between the two instruction forms was smooth and we avoided logistical chaos.

Her contributions were well received, as I can show with final student comments:
"*Making labs interactive even from the computer was really helpful towards my learning so I was able to take away a lot from this Lab*". Or: "*The course [was] offered in a way that allows for complete labs to be conducted inside and out of class*." And: "*One of my favorite classes.*"
One of her important contributions was on how she resolved instructional and technical challenges to teach the complex relationship between flowers and their pollinators in a virtual lab activity. She created a virtual adaptation of her interesting and fun 'Pollinator Speed Dating game', where students are to match flowers with their respective pollinators. She had developed this playful activity earlier for a flower course with physically attending students.

Relating to the instructional quality of her work, I can affirm that Rachel planned pro-actively, was highly organized, and prepared. She paid close attention to details and was passionate about the topics to be taught. It is important to emphasize that Rachel actually taught her class online, while she was suffering from COVID.

I expected that our freshmen would benefit from her creative teaching approach and engaging personality. My expectations were exceeded. Her passionate and creative approach to execute instruction of our labs was lovely. She aimed to engage and inspire our students and managed to do this despite COVID restrictions in face-to-face labs, virtual labs, and Zoom meets. Rachel made an important difference for our students as she motivated and encouraged students to take the lab as a great adventure, to be flexible and to learn. A student wrote: "I was not expecting to actually learn this much, which is a great compliment for a task well accomplished."

It was obvious that her students were aware and appreciated that she cared during rather complex and difficult COVID related circumstances. A student comments proves my point: "One thing the instructor does well is getting her students excited about the material because her excitement and love for the material was contagious."

In conclusion, I find it very important to recognize Rachel Perez-Udell as an excellent teacher, who is making science relevant to students, is always working hard, and is always going the extra mile to assist others. I can just see her making a difference to many, when she finally achieves her goal from the very beginning: becoming a professor a small liberal arts college!
I very strongly and most enthusiastically support her nomination for the 'Excellence in Teaching' award.
Sincerely,

Brigitte U. Bruns, PhD
Freshly retired Laboratory Coordinator, Department of Plant Biology