



The Goizueta-Woodrow Wilson Enrichment Microgrant Program Symposium

Presentation Packet | June 2, 2018



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Goizueta-Woodrow Wilson Enrichment Microgrant Program

The first class of Woodrow Wilson Georgia Teaching Fellows was named in 2015, with the Woodruff Foundation's support, to create new science and math learning opportunities in the state's high-need schools. Soon thereafter, with extraordinary generosity, the Goizueta Foundation established the Goizueta-WW Enrichment Microgrants, a complementary program for WW Georgia Teaching Fellows that has become Fellows' most powerful resource for creating those learning opportunities.

The Goizueta-WW Enrichment Microgrants allows WW Georgia Teaching Fellows to write proposals for small amounts of funding to attend or present at professional conferences, buy teaching materials for their classrooms, or complete community-based service learning projects. The microgrants have been enormously successful, as evidenced in the summaries of Fellows' projects that appear in this booklet.

As the Fellows make clear in their reports, the outcomes have not only strengthened their own teaching and sparked their students' interest in the STEM fields (science, technology, engineering, and math), but have also provided new resources for their colleagues and schools. The Goizueta-WW program includes workshops where Fellows can hear about the work they have all done with the Goizueta-WW funds; the most recent of these was the symposium held in Atlanta. Such gatherings provide another opportunity for Fellows to learn from each other, share best practices, and take home new ideas and energy.

The Woodrow Wilson Foundation takes tremendous pride in these Fellows, who have committed themselves to classroom excellence for their students and the communities they serve. The Goizueta Foundation has given them a truly exceptional opportunity to enrich their students' learning—and in fact other WW Teaching Fellowship states have since adopted the microgrants model, as a result of these successes. Enjoy learning more about these Georgia Fellows' impressive work as they help thousands of young people create new futures and address Georgia's—and the nation's—achievement gap.

List of Projects by Fellow

<i>Fellow (Partner Institution)</i>	<i>Pages</i>
John Alberts (Georgia State University)	9, 11, 29
Gabrielle Arondel (Georgia State University)	10, 37
Laila Bacha (Kennesaw State University)	5, 17
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Monica Cooper (Georgia State University)	8, 9, 26
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Cassy Smith (Georgia State University).....	49
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Mary Wagner (Georgia State University).....	10, 30
Marshai Waiters (Kennesaw State University).....	39
Natasaskia Wayne (Kennesaw State University).....	34
Jessica Wise (Kennesaw State University).....	50

For questions or more information about the Goizueta-Woodrow Wilson Enrichment Microgrant Program, please contact wwgatfmicrogrants@woodrow.org.

Conferences

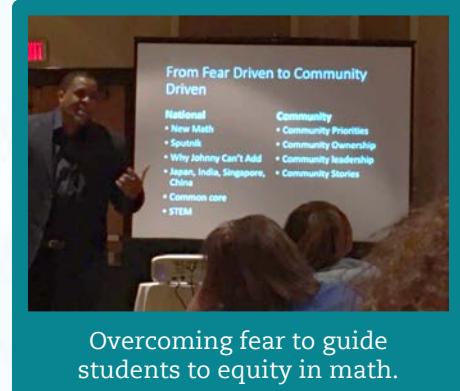
NCTM: Equity and Empowerment Practices

by Kireon Bunkley-Hill, Michael Peterson, and Elizabeth Quinche

2017 Cohort | Georgia State University | Therrell High School (Atlanta) | Arabia Mountain High School (Atlanta) | Maynard Jackson High School (Atlanta)

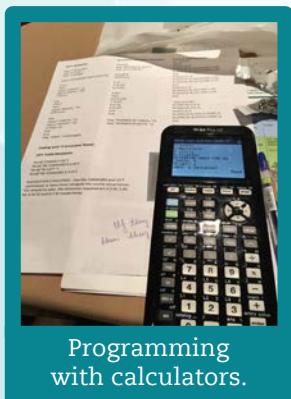
SUMMARY We wrote our Goizueta-Woodrow Wilson Enrichment Microgrant proposal on going to the 2017 National Council of Teachers of Mathematics (NCTM) Innov8 Conference to learn more about reflecting and developing mathematics instruction in term of access, equity, and empowerment. The goal of our project was to determine new teaching strategies that can help us identify and remove barriers to allow ALL students access to high-quality mathematics. We also wanted to build our professional network and meet other mathematics educators from around the country. We were inspired by the mission of the conference that year and by our courses we had taken at Georgia State University. Specifically, after reading many articles from Gloria Ladson-Billings, Rachel Guttierrez, and more, under the direction of Dr. Stinson, we wanted to gain tangible practices to connect our practice to the research on CRP.

IMPACT ON STUDENTS We hope to better support our students in mathematics by engaging them and promoting equity in the classroom using the ideas learned at the conference. We understand that mathematics is a privileged subject and that students have predispositions that can be hindrances to learning. One of the most impactful conversations from this conference was discussing the role of conceptual understanding next to the role of procedural fluency. Struggling students tend to be given more procedural instruction rather than conceptual instruction, and we witnessed how this did not improve their understanding of the concept. However, teaching concepts doesn't always lead to procedural fluency. We found that the best instruction for student benefit would pair both together. As a result, we plan to use this approach in our instruction to improve student performance.



Overcoming fear to guide students to equity in math.

EFFECTIVENESS IN TEACHING The conference gave us ideas on lesson planning, teaching strategies, and reflective practices that we can implement in our classrooms. This microgrant allowed us to learn from teachers all over the country and share our experiences. It also allowed for us to reflect on ourselves as educators and to see if we have any habits that could be detrimental to our students. We have improved as educators by reflecting personally as well as with each other to change our pedagogy to be more beneficial to our students. We have also explored more literature and found more value in research-based instruction and action research to see changes in our students. One such change was the use of more student-led activities to increase academic ownership and also help students believe in their capabilities. This helped students gain access to math, which they were denying themselves through their own negative perceptions of themselves. As teachers, we will be aware of this in the future and will always remember the need to reflect not only on ourselves, but also with others.



Programming with calculators.



Group session graphic organizer.

IMPACT ON EDUCATORS

We were able to share these experiences with our mentor teachers as well as our cohort members at Georgia State University who were not able to attend the conference. One such thing was the bridge between science and mathematics, especially computer science. At the conference, we had the opportunity to program with calculators and really see how mathematics flows so effortlessly into engineering. When returning, we had knowledge about different research and resources that was valuable to our math teams at school and we also had new ideas for lessons to teach our students. Outside of the classroom, we plan to blog and video our learning from the conference as well as the result of what we have changed in order to make it accessible globally through the internet.

WORDS OF ADVICE Take LOTS of notes and really talk to the speakers at the conference. They are very open and have a great deal of knowledge to share. It is also wonderful to have multiple perspectives on the conference and do a debriefing with your peers. Everyone took away something different and you could learn something you never knew before.

Goizueta-Woodrow Wilson Enrichment Microgrant

A Trip to NCTM: Picking Up Tips

by Kendall Schlundt and Laila Bacha

2016 Cohort | Kennesaw State University | Wheeler High School and Marietta High School (Marietta)

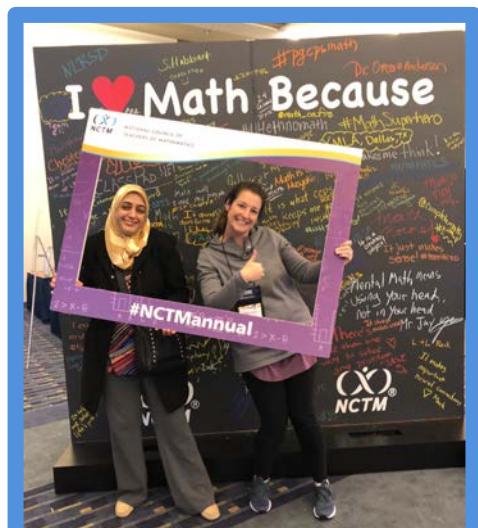
SUMMARY For our Goizueta–Woodrow Wilson Enrichment Microgrant, we wrote a proposal to go to the National Council of Teachers of Mathematics (NCTM) Conference in Washington, D.C. We had heard great things about the conference from previous years. We wanted to learn ways to make our classes more engaging, to help our students be more successful in learning math, and to make us better teachers. The goal of going to the conference was to attend as many sessions as we could and then discuss ways that we could implement what we learned in the classroom to make our students more active and engaged learners.

IMPACT ON STUDENTS By implementing what we learned at the NCTM Conference, I am hoping to incorporate more technology in my classroom by using Desmos and Geogebra to make math more engaging and exciting for my students. We also attended a session on creating an Escape Room that would be fun for our students. I hope students will be more excited to come to class and more willing to learn even when the math gets difficult. I would also like to create a more engaging class opening to get the students involved from the beginning of class.

EFFECTIVENESS IN TEACHING The NCTM Conference got us really excited for the next school year because we want to implement innovative lessons in our classrooms. The conference taught us how to be a great teacher and how to get students engaged. As a teacher, sometimes it is hard to get students excited about learning—especially when they struggle—but by implementing what we have learned will allow us to be better teachers and hopefully help us mentor other teachers well. Because the conference was later in the school year, we were not able to implement everything that we wanted to, but it has allowed us to prepare for the following school year. This year we were able to implement better opening and closing activities, but next year we want to create more innovative and engaging lessons that have the students talking about math among their peers.

IMPACT ON EDUCATORS After attending the conference, we shared what we learned with our collaborating teams and among our department. We talked about new ways to get the students more engaged and innovative ways of teaching material. At the conference, we learned new ways of giving formative assessments and ways to get our students engaged when they first walk into the classroom. We also wrote journal entries for each day of the conference that we have posted on Egnyte. Hopefully, we can share our experience with other teachers so that they can have a more successful teaching experience and assist other teachers who want to go to the conference through our experience at the NCTM Conference.

WORDS OF ADVICE We would definitely recommend going to the NCTM Conference. Before going, research the speakers that are going to be presenting and their topics, and plan the sessions that you want to attend to make the most of your experience. We would also recommend finding a good group of teachers to go with so that everyone can go to different sessions. Afterwards, meet up and discuss what you learned at the session.



Laila and Kendall
at the NCTM Conference
in Washington, D.C.

NCTM: Access and Equity in Math

by Jared Siler and Victoria Doctor

2017 Cohort | Georgia State University | Cedar Grove High School (Ellenwood)

SUMMARY We attended the National Council of Teachers of Mathematics (NCTM) Innov8 Conference in Las Vegas. It was a three-day conference aimed at providing educators with a better understanding of what access and equity in mathematics means. Over the course of the conference, there were keynote speakers, breakout sessions, and demonstrations by numerous education companies. A point of emphasis for the College of Education at Georgia State is Social Justice Mathematics. The words access and equity are used a lot when writing about Social Justice Mathematics, so we decided to attend the conference to get a better understanding of what these words mean, and more importantly, what they mean played out in our classrooms. Ultimately, we wanted to become better educators who were capable of providing a rigorous math curriculum that is sensitive to the cultural needs of our students.

IMPACT ON STUDENTS Students tend to view math as inflexible. Many of the breakout sessions featured experienced educators demonstrating problems they posed to their classes that inspired deep mathematical thinking and conversations. I hope that by presenting these kinds of problems in the future, my students will see the importance of mathematics in problem-solving and logic, and learn that math is not a cold, formulaic approach to the world, but a structured yet flexible approach to thinking.



Both groups attending a breakout session.

EFFECTIVENESS IN TEACHING The breakout sessions at the conference often had veteran teachers presenting challenging problems that they used to present material to their classes. Seeing these problems presented in a way that was challenging for a bunch of math teachers, but accessible for teenagers, stretched the way I think about challenging math and how I can present it to students. I will utilize this problem-solving approach as introductions to lessons in the future.

IMPACT ON EDUCATORS One of the sessions involved the card game, Set. Since returning from the conference, we have ordered four boxes of the card game so that students can play. We are going to show our fellow geometry teachers how we can take this game from the simplicity of pattern recognition to introducing students to the more complex ideas of parallel and skew lines and planes.

WORDS OF ADVICE When attending a conference, go with a plan in advance. There are so many speakers and breakout sessions that it is easy to get overwhelmed trying to decide where to go. Determine what aspect or theme of the conference you most want to engage with and plan to visit those speakers and breakout sessions.

NCTM and an Array of New Math Approaches

by Crispin Stromberg, Chelsea Robinson, Ben Jones, and Sarah Brumbaugh

2015 Cohort | Piedmont College | Redan High School (Stone Mountain)

2017 Cohort | Mercer University | Dodge County High School (Eastman) | Mary Persons High School (Forsyth)

2017 Cohort | Kennesaw State University | Paulding County High School (Dallas)

SUMMARY We chose to use the Goizueta–Woodrow Wilson Enrichment Microgrant to receive professional development. With the microgrant, four of us traveled to the National Council of Teachers of Mathematics (NCTM) Regional Conference in Chicago, Illinois in November and will be attending teacher training at the Ron Clark Academy in Atlanta, Georgia in May.

IMPACT ON STUDENTS Each of us has had different experiences and have taken what we learned to provide students at our schools with an array of benefits. Attending the NCTM Conference allowed us to learn about various resources and technologies including Woot Math, Polydoku puzzles, financial applications of Algebra II, and many more. Although one hope was to be able to speak at the NCTM Conference in Chicago, we did not have material ready prior to speaker selection. However, two Fellows were able to accompany a professor to speak at the NCTM Annual Conference in Washington, D.C., on April 28.

EFFECTIVENESS IN TEACHING

Through resources gained at the conferences, as well as teaching practices, we have been able to implement what we learned in our classrooms and share these resources with other teachers and Fellows. At the NCTM Conference, Chelsea was informed about the TI-Rover, a robotic vehicle controlled with a TI-84 graphing calculator. From the informational sessions from the conference, Chelsea purchased a robot and went back to her students to have an Hour of Code and robotics mini-lesson.



Chelsea's TI-84 controlled robot.

What is flipped?

- Traditional:
 - *In-class lectures. Whole class instruction.
 - *Homework problems from textbook. Work as an individual.
- Flipped:
 - *Homework watch video lesson as an individual, prior to in class work.
 - *In-class problems from textbook. Work in small groups. Time for activities, computer/calculator simulations.

Slide from session that was implemented in the classroom.

IMPACT ON EDUCATORS

Again, all of our experiences have been different, but we have been so eager to share what we have learned with other members of our cohort and school faculty. After returning from Chicago, Chelsea led a professional development session for the Algebra II teachers on Polydoku puzzles and various applications of polynomials. Cris and two other teachers on his school's AP team hybridized their AP courses using some of the ideas from a flipped classroom session.

WORDS OF ADVICE

Students are truly engaged when they can see the lessons come to life. When teaching the transformations of functions, students would much rather write a program in the calculator to see how the formulas come to life. Whenever you have the chance to incorporate technology, do it. It will make your classroom more fun for your students and give you a greater impact.

NABT: Hands-On, 3-D Learning in Biology

by Felicia Goldsmith, Hannah Tompkins, and Monica Cooper

2017 Cohort | Georgia State University | Cedar Grove High School (Ellenwood) | Arabia Mountain High School (Lithonia) | Maynard H. Jackson High School (Atlanta)

SUMMARY Our Goizueta-Woodrow Wilson Enrichment Microgrant project was to fund attendance at the National Biology Teachers Association (NABT) 2017 professional development conference. I had been to professional conferences such as Experimental Biology and the International Conference on Neural Tube Defects in the past while working as a biomedical researcher. Therefore, I was aware of how important such events are for both networking with other members of your field and staying on top of the latest and greatest research in said field. I was excited to attend the NABT conference in order to learn more about ways to effectively implement 3-D learning and Next Generation Science Standards (NGSS), especially relating to improvements in scientific literacy.

IMPACT ON STUDENTS One of the biggest takeaways that I had from NABT 2017 was to make learning relevant and hands-on, which is why I decided to implement more argument-driven and/or problem-based inquiry activities in my classroom. I have seen improvements in student engagement and motivation to learn course content (as indicated by higher grades and fewer disciplinary actions) as a result of implementing 3-D learning, e.g. recommended problem-based and/or argument-driven inquiry activities, in the classroom.

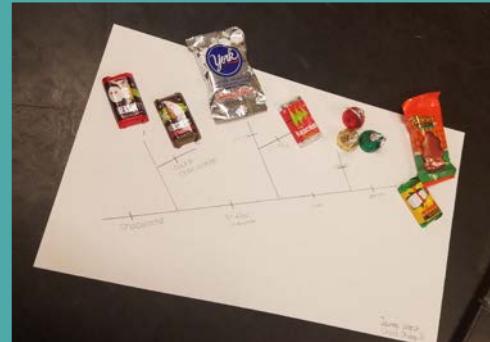
EFFECTIVENESS IN TEACHING This Goizueta-Woodrow Wilson Enrichment Microgrant project gave me a greater understanding of the structure and function of the NGSS, which allow me to more effectively implement student-centered, 3-D learning activities in my classroom. My students are more likely to actively participate in kinesthetic activities that require critical, creative thinking compared to traditional, passive lecturing when examples are useful and proper scaffolding is applied. After attending NABT 2017, I have come to the conclusion that effective teaching is anything and everything a teacher does in order to ensure that students are engaged in learning and that course-specific learning outcomes including, but not limited to, test scores and science process skills, are met.



From NABT to my classroom: a cell transport lab using “naked eggs” soaked in karo syrup, distilled water, and vinegar.

IMPACT ON EDUCATORS I have discussed my experiences and shared my field notes with my cohort at both the Woodrow Wilson Teaching Fellowship and Georgia State University as well as my fellow science teachers at Cedar Grove High School.

WORDS OF ADVICE Conferences are an excellent way to network with other teachers and gain insight about new developments in the field of teaching and learning. When thinking about attending particular sessions, or when determining the utility and relevance of a particular talk, ask yourself the following questions: Is it suitable? Is it practical? Is it fun?



Another NABT idea, a candy cladogram from our taxonomy and evolution unit.

NSTA: Resources for the Classroom

by John Alberts, Morgen Ricketts, Monica Cooper, Hannah Tompkins, Rebecca Morrissey, and Felicia Goldsmith

2017 Cohort | Georgia State University | Maynard H. Jackson High School (Atlanta) | Arabia Mountain High School (Lithonia) | Cedar Grove High School (Ellenwood)

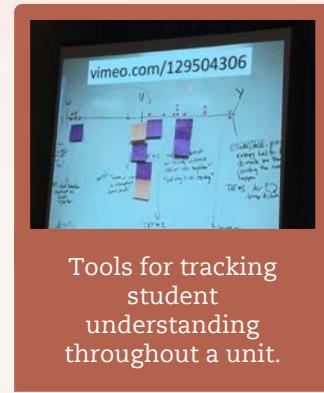
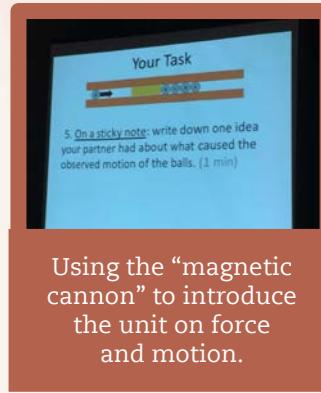
SUMMARY The National Science Teachers Association (NSTA) National Conference provides a unique opportunity to learn current pedagogy research, teaching strategies, research, and effective ways to implement these strategies in the classroom. The conference also provides the opportunity to learn effective teaching strategies to meet the newly adopted Next Generation Science Standards (NGSS).

IMPACT ON STUDENTS The NSTA National Conference provided Fellows who attended a variety of resources to effectively teach the newly adopted NGSS and to engage students in STEM. Plans for implementing these resources vary between each Fellow, but all include a revision of lesson plans for next year. These plans for future instruction include implementing active learning, modeling, argument-driven inquiry, culturally-relevant pedagogy, and specific experiments to better engage students in STEM.

EFFECTIVENESS IN TEACHING Attending the NSTA National Conference has supported and improved the teaching of Fellows by providing them with resources, teaching strategies, and new ideas. Resources for teaching modeling-based lessons have supported Fellows in designing student-centered unit plans. Strategies for grading phenomenon-based lessons have improved Fellows' implementation of 3-Dimensional lessons. New ideas of labs have improved the way Fellows engage students in STEM such as using a "magnetic cannon" to introduce the unit of forces and motion or using a lab quest and pH probe to measure the pH of a nearby pond.

IMPACT ON EDUCATORS There have been many opportunities to share ideas from the NSTA National Conference with other educators. These include discussions with colleagues in the Georgia State M.A.T. program, mentor teachers, and other science teachers at Fellows' respective schools. These discussions are informal ways in which knowledge was shared with other educators. Plans for formally sharing ideas from the NSTA National Conference include the creation of a PowerPoint summary of conference effectiveness.

WORDS OF ADVICE Conferences such as the NSTA National Conference are great opportunities to learn a variety of current teaching strategies and research. However, with so many sessions offered at these conferences, there are often multiple relevant sessions at the same time. It is difficult to predict what each session will be like and to choose between ones that are listed for the same time. To help decide which one to attend, it is beneficial to see if any of them have the same session at a later time or day and to research the presenters to predict what each session will be like.



Designing a water filter with common materials.



In what ways educators focus on inspiring their students.



Exhibit on the life cycle of plants.

New Ideas from NSTA

by Gabrielle Arondel, Tiffany Parsons, Mary Wagner,
Shamika Crawford, Jessica Carter, and Jayla Johnson

2016 Cohort | Georgia State University | Tucker High School (Tucker) | Southwest Dekalb High School (Decatur) | Chamblee Charter High School (Chamblee) | Miller Grove High School (Lithonia) | Therrell High School (Atlanta)
2017 Cohort | Columbus State University | William H. Spencer High School (Columbus)

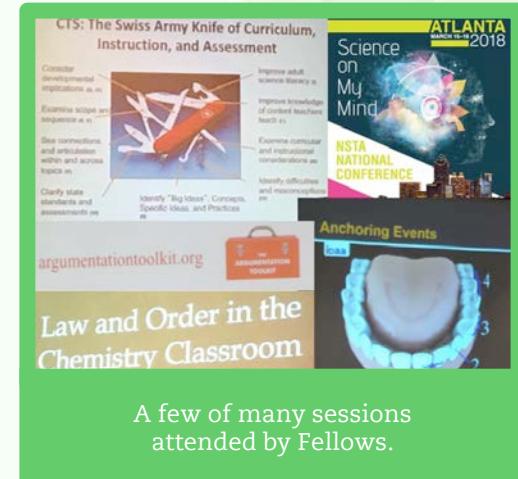
SUMMARY As science teachers and educators who are serving students with diverse and multicultural backgrounds, it is necessary to create and foster a positive learning environment which is culturally responsive to ensure students feel included in the scientific learning process. It is our responsibility not only to be culturally responsive, but also to increase students' scientific literacy, encourage them to become innovative scientific thinkers, and incorporate 3-D learning in the classroom. By attending the National Science Teacher Association (NSTA) National Conference of 2018, we were exposed to the new and pioneering tools educators are using throughout the country to address these various needs of our students. Our attendance at NSTA 2018 not only added to our professional development, but also inspired our colleagues to incorporate the new instructional strategies acquired at the conference, leading to the enhancement of the learning experience for all of our diverse students.

IMPACT ON STUDENTS The Goizueta-Woodrow Wilson Enrichment Microgrant allowed us to attend the NSTA Conference in Atlanta. Each of us had a different experience that strengthened our teaching. Furthermore, this microgrant was particularly productive since each of us was then able to take our experiences back to our home schools, bring new approaches to our students, and spread what we learned to teachers at our schools and in our districts. For instance, several of us were able to attend hands-on sessions with Vernier probeware for both biology and environmental science. These Fellows were able to immediately implement the lessons they learned in their schools and share with fellow teachers the ease of using the probeware with Chromebooks, which are now available in their schools. This allowed us to provide opportunities for authentic scientific experiences for students as well as teach our colleagues how to integrate existing probeware with the Chromebooks. One Fellow attended sessions on Forensics in an attempt to learn more about implementing a Forensics program from scratch in order to give her students more opportunities to explore their science options in her school. Sessions on differentiating science and writing in science was another focus of some of the Fellows that attended. Other Fellows attended sessions on supporting students through the claim, evidence, reasoning process, and how to create a culture of healthy argumentation in the classroom.

EFFECTIVENESS IN TEACHING At the conference, we had the opportunity to network with other teaching professionals, curriculum developers, and educational companies. Through our conversations, we learned new and engaging ways to implement the curriculum as well as best practices in the classroom. Ron Clark, the keynote speaker, delivered a high-energy, inspirational talk on his journey through teaching that led to his opening of the Ron Clark Academy here in Atlanta. His speech served as a reminder that our students are capable of meeting our expectations and need a teacher who will not settle for less.

IMPACT ON EDUCATORS The knowledge acquired from the various NSTA Conference sessions will be presented to the other Fellows on the Egnyte platform through a PowerPoint presentation and reflection videos on the sessions attended. Links and resources provided at the conference will be uploaded on Egnyte for use in others' classrooms. In addition, the presentation that is created for Egnyte will be uploaded to the Science Pride Group Page for Dekalb County and will also be sent to the Regional Superintendent of our district, along with the Woodrow Wilson Foundation. This presentation will also be presented to fellow staff members at our school during a PL meeting.

WORDS OF ADVICE Attending conferences, especially as a group of Fellows or Fellows with mentors, is an excellent way to reinvigorate teaching and expand techniques for teaching. We would recommend planning time to get together for lunch or dinner during the conference. This provides an opportunity to debrief and reflect on the sessions which helps to solidify the take-away message from different sessions. In addition, it also provides an opportunity to share the must-see session or exhibit with the other Fellows thereby enhancing their conference experience.

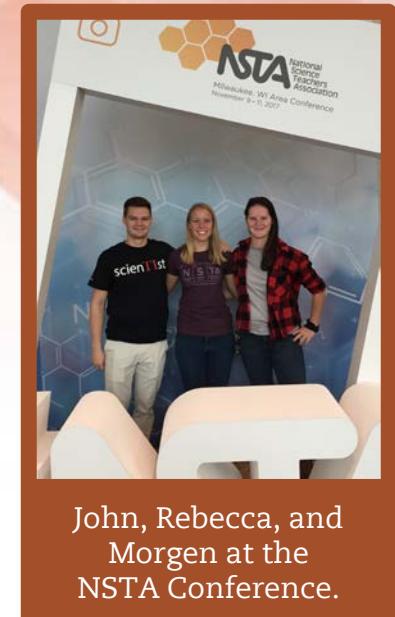


Physical Sciences PD at NSTA

by Rebecca Morrissey, Morgen Ricketts, and John Alberts

2017 Cohort | Georgia State University | Arabia Mountain High School (Lithonia) | Maynard Jackson High School (Atlanta)

SUMMARY This Goizueta-Woodrow Wilson Enrichment Microgrant allowed three new chemistry and physics Fellows to attend the National Science Teachers Association (NSTA) Milwaukee Area Conference, “Making Waves: Moving Science Forward,” to gain new knowledge and strategies to use in their classrooms. While many NSTA conferences have a focus on life sciences, the Milwaukee conference had more than 200 sessions relating directly to physical sciences education and presenting new strategies to use in teaching physical sciences. These sessions provided an excellent opportunity for new teachers to learn strategies that they could immediately apply in their classroom. The Fellows who attended not only learned a great deal from the sessions offered, but also got to meet other educators and education professionals and build valuable connections. Other attendees came from all science backgrounds and types of schools, so the three Fellows were able to learn a great deal about education across the U.S., discuss differing strategies, and debate differing viewpoints. These discussions allowed the Fellows to broaden their own horizons. There is a great deal of energy in a room full of like-minded people who are all passionate about what they do. The Fellows attending the Milwaukee conference were able to capture this energy and bring it back to their home schools.



John, Rebecca, and
Morgen at the
NSTA Conference.

IMPACT ON STUDENTS Apart from the learning opportunities and connections, the Milwaukee conference gave the Fellows in attendance an opportunity for personal and group reflection. It can be a challenge in our everyday environments to spare a moment for reflection. Attending a conference where there is an aura of learning, thoughtfulness, and overall excitement about the field of education allowed the group to engage in self-discovery and provided an opportunity for contemplative thought. After the conference, all of us were reinvigorated and excited to return to our classrooms. Our students felt that enthusiasm and also became more excited as a result.



Learning to
make chemistry
fun through
gamification!

EFFECTIVENESS IN TEACHING The knowledge that we have gained from the conference—including many new strategies for challenges that we were dealing with in the classroom—has been valuable. A midyear professional development opportunity like NSTA makes it possible for attendees to implement the things they learn right away.

IMPACT ON EDUCATORS We have prepared and shared a presentation of some of the most useful sessions and have shared any resources which we obtained at the conference.

WORDS OF ADVICE

Choose sessions carefully. Figure out what you want to get out of the conference and go to sessions that fit with those goals.

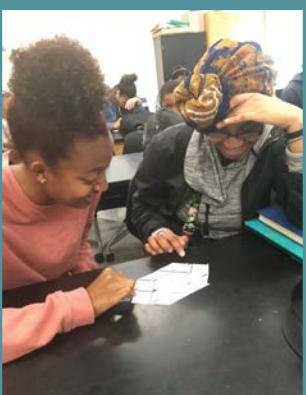
NSTA for an Entire Science Department

by Laura Rogers and Mike Sommer

2016 Cohort | Mercer University | Fayette County High School (Canton) | Salem High School (Conyers)

SUMMARY Last year, I was able to attend the Georgia Science Teacher Association Conference with my fellow Woodrow Wilson Teaching Fellows and mentor teachers. I was inspired and reinvigorated throughout the week and knew that I wanted to attend another conference this year. This year, the National Science Teacher Association Conference was held in Atlanta, Georgia. I could not pass up on this opportunity, so I used the Goizueta-Woodrow Wilson Enrichment Microgrant to fund attendance at the conference. I wanted my entire science department to attend the conference because I knew that we all would be able to get different things out of it since we all teach different subjects. This way, we could bring back all of our ideas and collaborate to have the biggest impact on our students. Teacher education is often something that school systems do not have funding for, but this microgrant gave everyone in my department an amazing learning experience that helped us to improve our craft as educators. Although the ultimate goal of this microgrant was teacher education, it also had a great impact on our students.

IMPACT ON STUDENTS I have been shocked at how many concrete lessons I received from the conference that I can implement in my classroom regularly. Originally, I wanted to bring back three lessons to my classroom, but I can't even count the number of lessons and ideas I was able to learn about and bring back in the past two months. After the conference, I felt that I was more invigorated as an educator and more excited to be in the classroom. I know that I was not the only one who felt that way. One teacher at my school that attended the conference reflected that he "enjoyed going to many sessions about phenomena and activities in the classroom that I can use to engage students and make my curriculum more student driven." I, along with the other teachers who attended, have already implemented a number of different lessons into the classroom and kept detailed notes of things we can use for next year. One of the most valuable resources we received was training in PASCO equipment. We are lucky in Fayette County to have a plethora of science sampling equipment from PASCO, but we often feel that we do not have enough time to learn about how to use it in our classrooms. The opportunity to learn more about how to incorporate STEM lessons with PASCO equipment that we already have was invaluable. Many of the teachers who attended this conference shared the sentiment that these sessions were incredibly useful in creating STEM-based lessons in all of our science classes.



Students finishing one of the great lessons that we learned at the conference.

EFFECTIVENESS IN TEACHING I know that I am a better educator because of this conference. I was able to meet, discuss, and share ideas with some of the best and brightest in science education. I hate to admit it, but I was feeling a bit burned out right before the conference. I came back to the classroom renewed and restored. After seeing so many inspiring sessions with engaging lessons and opportunities for my students, I felt that I could come back into the classroom and make it a student-centered place for students to think critically about the world around them. I have used many more hands-on and student-centered learning activities since coming back.

IMPACT ON EDUCATORS This project had an impact on teachers at three schools, if not more. Nine teachers from Fayette County High School were able to attend the conference, which was fantastic because we were all able to go to different sessions and share what we learned. We have department meetings every Friday and my favorite meeting so far was getting to share the lessons we learned. I know that this conference had a profound impact on all of the educators that attended, based on some of their reflections: "It recharged my batteries and reinvigorated me in my teaching"; "My time at the conference did so much to boost my energy and excitement to return to my home school with new ideas, better methods, and an invigorated attitude and outlook"; and "I thought this was an amazing opportunity to find new ways of teaching concepts that my students have struggled with, while also learning how to implement new techniques as we transition into block schedule."

WORDS OF ADVICE My advice to all educators is to dream big and talk with other teachers at your school! As a new teacher, it can be difficult to know exactly what you need, but I was able to use this microgrant to help everyone attend a conference that they otherwise would not have had the chance to. I would have never realized the opportunity to bring the entire science department to the conference without speaking with them first. The more people that are able to attend these professional development opportunities, the more students will be affected. We were able to share our greatest ideas and discoveries. We were even able to use the rest of our science department funding to buy a manipulative that one of the teachers learned about at NSTA for biology. The teachers in the science department could not be more grateful for this opportunity to learn so much!

Goizueta-Woodrow Wilson Enrichment Microgrant

The Middle School Math Conference/ Mathematics Supplies

by Brandon Hewitt

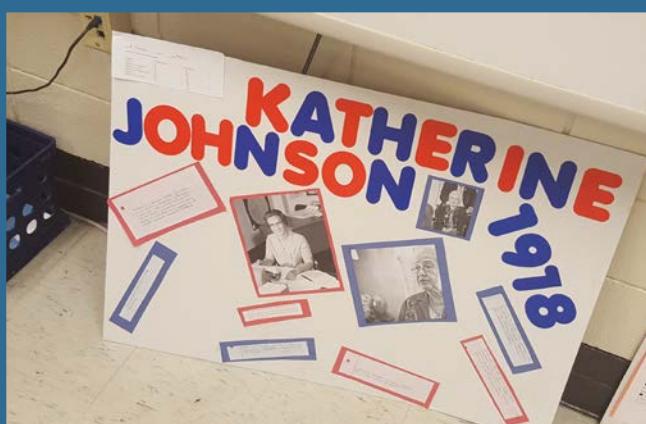
2015 Cohort | Columbus State University | Miller Grove Middle School (Decatur)

SUMMARY My Goizueta–Woodrow Wilson Enrichment Microgrant project consisted of attending the Middle School Math Conference in New Mexico. I was hoping to improve my teaching skills and get new and innovative ideas by interacting with other middle school math teachers. I also purchased much needed supplies such as calculators, pencils, etc.

IMPACT ON STUDENTS The supplies had an immediate impact on my class. The calculators are used daily, saving time and eliminating the need to do manual calculations. One of the ideas I got from the conference was to include, in my weekly lessons, how math is used daily and what professions actually use math. In other words, what do mathematicians do? My students are beginning to see what math is really used for.

EFFECTIVENESS IN TEACHING The Goizueta–Woodrow Wilson Enrichment Microgrant allowed me to purchase much needed supplies. I was also able to obtain several classroom math projects that were used by teachers at the conference. I am using them in my classroom now.

IMPACT ON EDUCATORS I have shared the math projects with my colleagues. I have compiled a list of women and minority mathematicians that can be shared with our students.



Black woman mathematician at NASA.

WORDS OF ADVICE Always prepare for a conference before attending. If possible, read the presenters' materials before attending the sessions and have questions ready. There is usually time to talk with presenters after their presentation. Before you attend the conference, decide what it is you hope to achieve. For example, you may want to get some ideas on how to teach statistics more effectively. You can ask your colleagues for ideas as well as the presenters.

Service Learning Projects

Clean Drinking Water Solutions

by Amanda Barrett

2016 Cohort | Kennesaw State University | Marietta High School (Marietta)

SUMMARY The physical goal of this service project was to create a water purification system that is inexpensive and sustainable while exposing the students to real-life problems to solve. The ultimate goal was to demonstrate that individuals at a young age can have a global impact and to lead the students to reflect on the interconnectedness of the world and sustainability. I was inspired to write this proposal because access to drinking water should be available to everyone, everywhere. Lack of potable water is an issue that everyone may face someday as the problem continues to spread.

IMPACT ON STUDENTS Among of the observed changes in students' dispositions toward STEM as a result of this service project is a gain in confidence in their ability to perform tasks in science. Their comfort in taking risks has increased and they are no longer afraid of being wrong, but instead now have a growth mindset – what they once considered mistakes they now think of as a learning opportunity. The contemplation of how each student can affect others is also having a positive influence on their future leadership position. One student expressed her excitement about being a role model: "I wanted to show younger girls that engineering wasn't just for boys." Students also seemed to realize how fortunate they were to have access to things they take for granted, like drinking water. There are water fountains all over the school and in their community, and they don't have to worry about quality of water when they turn on their faucet to get water for drinking or cooking.



Student designing her water purification system.



Water purification and hydroponics system design.

EFFECTIVENESS IN TEACHING The Goizueta-Woodrow Wilson Enrichment Microgrant Program has allowed me to provide new technology to students so they can create and design theoretical water purification systems before building them, and to give them access to advanced instrumentation to test water quality. This permitted the students to acquire experience in utilizing instruments and chemical reagent kits to examine water quality and to use design thinking to create solutions to real-life problems. After reflection, my teaching improved in that I now try to provide examples of relevant problems or situations in order for the students to better understand how science occurs in the world and is useful for problem-solving. I now appreciate a student-centered, student-driven learning environment as I was astonished at how thoughtful, mature, and collaborative the students were when given the opportunity to lead.

IMPACT ON EDUCATORS Through cross-curricular efforts, students will tie in biology, chemistry, and engineering techniques and processes to overcome real-life obstacles and share their knowledge and experience with not only their peers, but also the community. In the next tier of this project, educators from K-8 grades will be joining our efforts in a vertically aligned curriculum that the students will carry over each year throughout their academic career in K-12. We (the teachers) will be meeting to communicate our experiences and expand on the impact of the project on the students and how we can make improvements/modifications to continue driving this project forward. In addition, we will be presenting our results to other teachers to increase participation and awareness in conferences and symposiums.

WORDS OF ADVICE Start the project early and allow the students to direct the project. Instead of being a "teacher," be a supporter or facilitator. Collaborate, collaborate, collaborate! Ensure that all the educators involved are on the same page and communication lines are open before implementing plans.

A Farmbot for Learning Urban Agriculture

by Leslie Dunham

2015 Cohort | Piedmont College | Meadowcreek High School (Norcross)

SUMMARY Meadowcreek High School created a community garden several years ago as an educational and outreach opportunity to teach skills in urban agriculture and provide a source of fresh, nutritious food to families in our school. The Goizueta-Woodrow Wilson Enrichment Microgrant allowed us to purchase additional materials needed to maintain our current garden and expand its capabilities. In addition, a major goal of this microgrant was to merge two school focuses—urban agriculture and robotics—through the purchase and installation of a FarmBot robotic farming apparatus.

IMPACT ON STUDENTS Meadowcreek has a dedicated and energized group of students interested in the environment and in giving back to their community broadly. I believe this project has empowered students to see themselves as capable of making a difference in a variety of ways. Students have the opportunity to learn practical skills (farming and agriculture) and to see how technology can intersect that world through the FarmBot. I have seen an increase in interest in the garden from some students since the installation of the robotic farming apparatus, and they are excited to be able to implement their coding and programming knowledge to maximize the schedules and routines that the FarmBot will conduct to take care of the plants. As more students have the opportunity to work in and become more actively involved in the planning and care of the garden, I expect to continue to see their enthusiasm and self-efficacy grow.



Indoor seeding rig that students used to start seeds for spring planting.



Student helps build Farmbot.

EFFECTIVENESS IN TEACHING This project has provided an excellent opportunity for me to bring more real-world significance to my classroom and content. Even where there are not strong overlaps between the garden work and my content work, having the plants growing on the indoor grow system in my room has sparked interest and questions from my students. They want to know more about what we are growing, the process of gardening, and how they can get involved. In addition, seeing the dedication and excitement of students as they realize they are making a positive impact on their community has inspired me to find more ways to incorporate service learning into my classroom.



Students fill raised garden beds.

IMPACT ON EDUCATORS We have developed a website to track what we are growing in the garden and show our progress and development of the FarmBot. Through this site, we hope to share and document our vision for the community garden and provide insights to others on the struggles and triumphs we have experienced along the way. In addition, we are active on the FarmBot web forum where we have already been able to get and share ideas with other schools interested in bringing FarmBot to their schools.

WORDS OF ADVICE If your project involves permanent or semi-permanent installation of something on your campus, make sure you have a strong advocate in your corner. Especially in a large school, it can be difficult to find out who you need to talk to in order to move forward with different things. Roping in your department chair or an administrator can help to streamline the process. Also, take into account extra time delays as approvals and work requests are scheduled.

Equipment and Chromebooks for Testing Water Quality

by Martina Smith

2017 Cohort | Piedmont College | Meadowcreek High School (Norcross)

SUMMARY My Goizueta-Woodrow Wilson Enrichment Microgrant project consisted of Chromebooks, scientific wireless equipment, and the opportunity to take students on a field trip. Technology, when integrated into the curriculum, revolutionizes the learning process. Students are engaged in their learning using these powerful tools, and can become creators and critics instead of just consumers. The need was supported through a survey I conducted with the biology team at Meadowcreek High School. With the change in the Gwinnett County AKS, the students must “do” and teachers facilitate. The process was simple to collect: I asked questions on how technology would improve classroom learning with the change of the new standards and used the data to select what devices would be most useful. The goal of the project was to provide different ways of obtaining water quality data to build out the school's database on its surrounding water quality.



Students conduct water testing at Lake Lanier.

IMPACT ON STUDENTS I expect the students to become engaged and experience the content in multiple areas to express how it relates to them. The project has intrigued the students in both my senior and freshman classes where both sections want to know more on the content. I incorporated Chromebooks on many occasions because the students love using the computers in class and love collaborating as a way to learn the content.



Students work in a group to conduct research and compare data.

EFFECTIVENESS IN TEACHING The funding enabled me to provide multiple perspectives on a topic and lock students' engagement. The Chromebooks and science equipment enabled me to create a student-centered, student-driven environment that encourages innovation and creativity. In an ever-growing, globalized society, students are able to use the device as a gateway to information, as a means to collaborate with others while extending student learning beyond the walls of the classroom, and as a way to engage in real-world problems by collaborating with others in the classroom. The data will provide information to their peers about the quality of water running through the school.

IMPACT ON EDUCATORS I have shared pictures of the students on the science and class page. The students will present their data collected from various locations and their eco columns to other science classes in the library for a project-based learning activity.

WORDS OF ADVICE Technology engages students. The best decision I made was obtaining devices I could use in multiple science content sections.

Classroom Materials

Chromebooks for Math Learning

by Laila Bacha

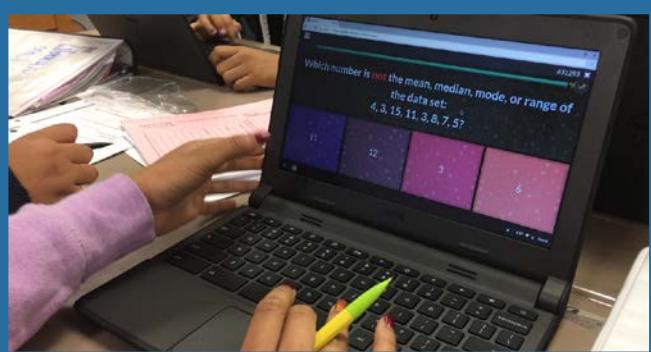
2016 Cohort | Kennesaw State University | Marietta High School (Marietta)

SUMMARY I am a first-year teacher at Marietta High School, the same school I was student teaching at last year. I had previous success using Chromebooks in the classroom and, since my class size is bigger this year, I wanted to purchase 10 more Chromebooks so every student would have his/her own device. This would help differentiate ways of learning. I also purchased classroom supplies like headphones, document camera, and instant cameras to catch the unique moments in the classroom.

IMPACT ON STUDENTS My auditory learners were able to watch and listen to videos. I used Chromebooks to differentiate big assessments. As an instructor, I used the Chromebooks to encourage independent learning to explore and master the standards. I assigned Desmos and quiz-like activities to my students to help them concentrate on the standards that they were missing or struggling with. Based on the data, I will reteach and plan for the next topic.

EFFECTIVENESS IN TEACHING Chromebooks and the programs we used helped me get feedback about my students' knowledge and improvement. I used the data from pre-assessment to reteach and plan my lessons to improve my students' achievement.

IMPACT ON EDUCATORS I was able to share the use of quizzes and Desmos with the PLC Algebra 1 team. Everyone on the team started using the programs, and they were very impressed with the results.



Quizzes on Chromebooks.

WORDS OF ADVICE Using technology in the classroom has side effects sometimes. Teachers need to be aware that students could pretend that they are doing work while they are playing games or surfing the net. I advise educators to use great programs that allow them to follow and monitor their students' learning.

Chromebooks and Student-Centered Learning

by Allen Clarkson

2015 Cohort | Columbus State University | Peachtree Ridge High School (Suwanee)

SUMMARY I used the Goizueta-Woodrow Wilson Enrichment Microgrant to purchase a set of Chromebooks for my classroom. After seeing and talking with another Woodrow Wilson Fellow who purchased her own set of Chromebooks using the microgrant, I thought about all the ways they could positively affect my classes. With this new resource, I wanted to bring more technology into the classroom so my students could advance their research and basic computer skills. These skills are crucial for all young adults, both in STEM and non-STEM fields.

IMPACT ON STUDENTS With high school education striving towards more student-centered learning, the set of Chromebooks have given my classroom an extra tool to allow students to improve their educational autonomy. Using the Chromebooks have allowed the students to research the answers or use one or more resources to better understand concepts. These research skills they are developing in class with the Chromebooks are vital to STEM fields and to helping students further their education and critical thinking skills. Also, for some students who are not as adept at using computers, the Chromebooks help them practice basic skills like using the internet or creating presentations.

EFFECTIVENESS IN TEACHING The funding from the Goizueta-Woodrow Wilson Enrichment Microgrant has given me more of a very valuable resource as a teacher—time. The Chromebooks have saved me and my students so much valuable time. Whether it is not having to go to and from a computer lab, or not having to struggle to research on a cell phone, the Chromebooks have made my classroom more efficient. The microgrant has also allowed me to plan more lessons centered around student collaboration, using programs like Google slides and Google docs. These lessons let students practice more of the 21st century skills they need.

IMPACT ON EDUCATORS As the use of technology increases in the classroom, teachers need more lessons and ideas on how to incorporate it in their own classroom. After creating collaborative lessons centered around the Chromebooks, my fellow environmental science teacher at my high school has started to use them. We have even started collaborating together to improve the lessons to better help the students learn scientific concepts and advance their post-secondary education skills.

WORDS OF ADVICE One word of advice is to not assume that all students have basic computer skills. When I started using the Chromebooks with my senior environmental science class, I thought they would have the knowledge to start using the computer programs right away. Next time I introduce the Chromebooks to a new class, I will begin with a lesson that teaches the basics of Chromebook usage.



Students researching different types of renewable energy for a project.

Chromebooks for Research Literacy in Chemistry

by Rebecca Morrissey

2017 Cohort | Georgia State University | Arabia Mountain High School (Lithonia)

SUMMARY Early on in the school year, I realized that one of the biggest challenges my students faced was not with using technology, but with using technology effectively. Surprisingly, my students, who grew up in a generation where information is available in seconds, struggled the most with the science and engineering practice of “obtaining, evaluating and communicating information.” I believe that this challenge is due to a lack of instruction on how to gather and utilize research. The goal of my Goizueta-Woodrow Wilson Enrichment Microgrant was to allow students to have increased exposure to scientific research and presentation. I wanted my students to participate in more research time, Excel data analysis, online labs, and online simulations. Having regular access to computers allowed this to happen and my students experienced many of the science and engineering practices on a more regular basis. These skills are critical for success in college and in the working world. Having increased access to laptops in the classroom helped to facilitate the development of these skills. I know that I don't have all the answers to my students' questions. Instead, I want to teach my students how to find the answers.

IMPACT ON STUDENTS My students have become much more confident in their abilities to find information on their own. At the beginning of the year, when sent to do research, the students didn't know where to begin. Now, when asked to find specific information, they have a lot more confidence. Some of my students have reached a point where they really want to find information on their own rather than have me give it to them. When they find the information, it gives them a sense of ownership and pride in their learning. This to me is so much more satisfying than providing them a PowerPoint of information. Instead, I can provide them just enough scaffolding so that they can find the information on their own and in the process they learn way more than I could possible tell them! In addition to the confidence doing research, my students have been exposed to a number of new platforms this semester. At the beginning of the semester, many students did not know how to do simple things like center something in a word document. Now the students have used Google docs, sheets, and slides. They have basic proficiency in all three, which sets them ahead of many of their peers.



Working with a student to edit her limiting reactant lab data.

EFFECTIVENESS IN TEACHING I think the biggest impact that it has had on me is in my ability to differentiate. Having access to technology all the time enables me to provide multiple levels of instruction in the classroom. Students who understand the concepts quickly can extend their knowledge through a project. Students who can work independently, but require practice, can work on online practice where they can receive immediate feedback. Having these students busy on the computers enables me to work closely with my struggling students and either reteach or provide more small group practice time. This has made me much more effective in meeting the needs of all of my students.

IMPACT ON EDUCATORS I have been fortunate in that I have been able to share all of my ideas and lessons with the chemistry team at my school. Although they do not have daily access to computers yet, they will be able to take the things that worked really well in my classroom and improve them for use with their students.

WORDS OF ADVICE Don't get carried away at first. Using Chromebooks in the classroom is a challenge for the students at first. Start small and build up to using the Chromebooks all the time. When choosing a cart or other storage space for the Chromebooks, be sure to consider transitions. A cart is nice because it can be rolled out of the way when it is not being used, but it can cause some backups when students are putting the Chromebooks up. Storage bins or cabinets may be a better option if you have the space.

Chromebooks for the Math Classroom

by Kendall Schlundt

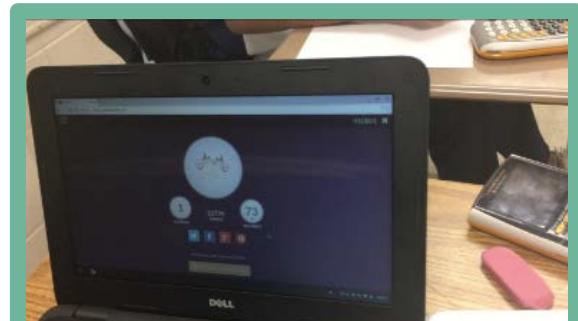
2016 Cohort | Kennesaw State University | Wheeler High School (Marietta)

SUMMARY Last year I was awarded 20 Chromebooks for my classroom, which was such an amazing experience. I used the Chromebooks almost every day for either the lesson or activity. The students were very engaged and their scores improved as well. This year, I applied for the Goizueta-Woodrow Wilson Enrichment Microgrant to get 10 more Chromebooks and whiteboards. I wanted to have a class set of Chromebooks so students would not have to have a partner. I thought this would help with students getting off task and keep them engaged in the activity. I wanted the whiteboards because I could use them to play learning games and to give formative assessments. The goal of my microgrant project was to get my students excited about learning math.

IMPACT ON STUDENTS By increasing the amount of technology in the classroom, students have become more engaged in math. They are excited to learn because they can do fun activities on the Chromebook or we can play Jeopardy using the whiteboards. The Chromebooks allow me to differentiate the class by creating activities that are different levels, so every student is learning on his or her own level.

EFFECTIVENESS IN TEACHING Because of the microgrant, I have become a better teacher. I can make my lessons and activities more engaging for my students. I can also differentiate my lesson, so that I am helping more students be successful. I can also give more formative assessments, so as I teach I can see what's the best direction to go with my students. For instance, I may need to take an extra day to go over the material again or, based on the formative assessment, we can move ahead.

IMPACT ON EDUCATORS Not only can I share my Chromebooks with other teachers, but I can also share activities that I have created using the Chromebooks. Other teachers have asked to use my lessons that I have created with Desmos. We collaborate a lot at Wheeler High School, so by having this resource we can all be successful.



The Dell Chromebooks that the students use in my geometry class.

WORDS OF ADVICE Before getting Chromebooks, or other technology, make sure that it works well in the school. When I first got my Chromebooks it was really hard to use the Wi-Fi and my students had trouble logging in, so just make sure the technology you are getting works well in your school environment.

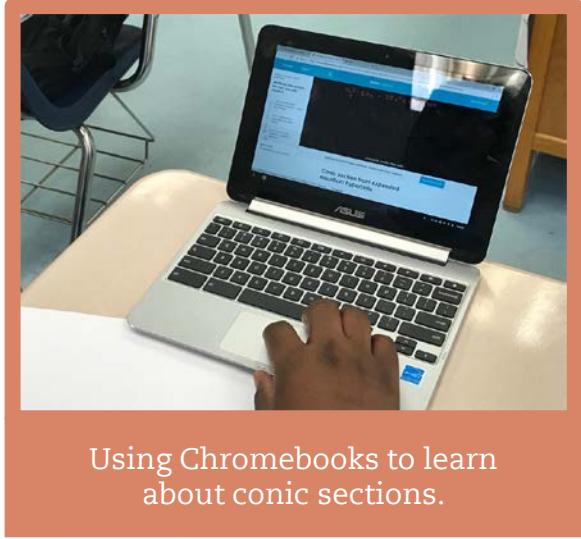
Chromebooks for Math Learning and Assessment

by Jared Siler

2017 Cohort | Georgia State University | Cedar Grove High School (Ellenwood)

SUMMARY It was important to me as a new educator to introduce technology into the classroom. I love technology and the benefits it provides me in my daily life, so extending it to the classroom seemed like a no-brainer. I chose to go with Chromebooks because of the versatility they provide. Scientific calculators and other, more specific devices are nice, but are limited in their capabilities. Chromebooks give the students access to numerous online applets and resources. The ultimate goal of incorporating technology into the classroom was to make it easier to differentiate learning, promote student engagement, and expedite assessment.

IMPACT ON STUDENTS The primary impact that Chromebooks have had on the students is their engagement with mathematics. Chromebooks have made it easy to incorporate competition into the classroom environment. This competition between students and groups of students has had a noticeable impact on the level of engagement. Often it can be difficult to get students engaged with conic sections or geometric transformations, but the element of competition changes that.



EFFECTIVENESS IN TEACHING The greatest impact the Chromebooks have had on my teaching is in the area of assessment. Assessment, especially informal assessment, can be very challenging. It is hard to make assessments on 25–30 students every day and to modify instruction based on this feedback. With technology, assessment can be immediate and individualized. Through the use of online applets and services, I can see in real time what students' misconceptions are and immediately address them. Instead of poring over quizzes and tests with a pen to make these determinations, I can respond in real time to the students' needs. Another impact the Chromebooks have had on my teaching is in differentiation. Technology makes it very easy to provide visuals and manipulatives for students who are more visual learners.

IMPACT ON EDUCATORS I have been able to share my experiences with technology, and specifically the Chromebooks, during our collaborative planning sessions. Through the use of the Promethean Board, I have been able to demonstrate to fellow teachers the benefits of the Chromebooks for students and for teachers. Teachers have liked how most of the online applets allow teachers to follow along in real time to assess student progress. I have also had the opportunity to present my experiences with Chromebooks at a technology retreat at Georgia State University.

WORDS OF ADVICE If there is one word I would use to sum up my advice, it would be balance. Too much of a good thing can be a bad thing. I think we need to strike a balance between technology, direct instruction, and collaborative learning. Finding the right balance among these things is challenging, but necessary in the learning environment.

AP Biology With Chromebooks

by Catherine Trice

2017 Cohort | Piedmont College | Lanier High School (Sugar Hill)

SUMMARY I wrote a proposal to the Goizueta-Woodrow Wilson Enrichment Microgrant Program for a class set of Chromebooks and a charging cart to store them in. I pursued the program because I believe that technology is such an empowering tool for students and can be used to enhance their understanding of scientific concepts. My goal was to teach students how to properly use technology for educational purposes, such as research, virtual labs, and project collaboration. I anticipated that with the use of Chromebooks in my lessons, I would increase student engagement and interest in the science content.

IMPACT ON STUDENTS I have seen a positive influence on student engagement after implementing the Chromebooks in my lessons. My students enjoy using technology and show excitement when I tell them that we will be using the Chromebooks to learn. I believe that this excitement facilitates an interest in the content that they are exploring, forming a positive disposition towards STEM-related topics. I have also noticed that students are able to move at their own pace and I can provide individualized support to students when they need it.

EFFECTIVENESS IN TEACHING This microgrant has greatly supported my teaching because I now have a set of Chromebooks for my students to use at any time. I can plan virtual lessons knowing that my students will have access to the Internet, and also have them available for students to quickly search for support if they would like further explanations or demonstrations to grasp the content. My students have benefited from this grant because it provides a variety of experiences for them to deepen their understanding and allows for opportunities to receive the content in a different way.

IMPACT ON EDUCATORS I have shared my experience at a conference hosted by my college, Piedmont College, in which I explained the steps I took to complete the microgrant proposal and project. I also explained the differences I saw in student engagement and interest from before and after the implementation of these Chromebooks. My current colleagues have actually been able to benefit directly from this microgrant as well because they have borrowed the Chromebooks to use in their own classrooms. They have expressed their appreciation, as well as their students, for being able to use this technology to enhance their learning experiences.

WORDS OF ADVICE For other educators who are interested in implementing this same project in their classrooms, I would suggest researching different technology companies who offer educator discounts in order to maximize the granted amount of funding. I also advise teachers to set clear expectations for when and how the equipment should be used during instruction in an effort to optimize learning.



My AP Biology class using the Chromebooks to work through a virtual lab about photosynthesis and cellular respiration.

Netbooks for Differentiation in Geometry

by Crispin Stromberg

2015 Cohort | Piedmont College | Redan High School (Stone Mountain)

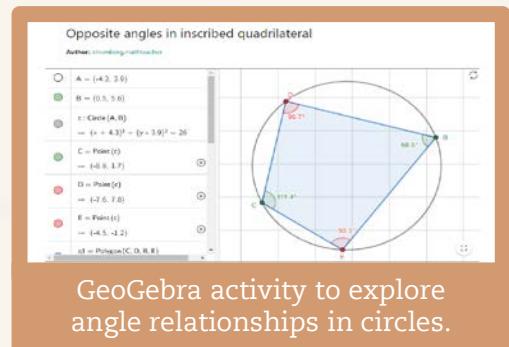
SUMMARY The knowledge that my students missed so many opportunities for enrichment, exploration, and reinforcement because of my school's limited technology resources inspired me to write a proposal to the Goizueta-Woodrow Wilson Enrichment Microgrant Program for a classroom set of netbooks. The goal was to increase students' mathematical understanding through modeling using Geogebra, to add opportunities for differentiation with webquests and other self-directed explorations, and to make practice more effective using software with immediate, quality feedback, like Khan Academy and IXL.

IMPACT ON STUDENTS Students who gave up easily before the arrival of the netbooks were more engaged in their learning. Having immediate feedback during practice helped the majority of students to work more independently and grow from their struggles. There have been "a-ha" moments as students explored concepts like dilations of geometric figures, rotations of 2-D objects in 3-space, collecting and analyzing real-life data, and building distributions.

EFFECTIVENESS IN TEACHING The funding for technology has made it possible for me to have a significantly more differentiated classroom. I can do small-group and individual instruction with students who need a lesson to be revisited while other students go deeper in a Geogebra book or webquest. As a result, I am more effective at helping every student reach further, no matter the starting point.



AP Statistics Project completed on computers.



GeoGebra activity to explore angle relationships in circles.

IMPACT ON EDUCATORS I have been one of the lead teachers in my department and school when it comes to using learning software with our students. I have led a few PLCs on using our Learning Management System, Khan Academy, and IXL. I have also shared GeoGebra demonstrations with my team and they are also available in the GeoGebra community.

WORDS OF ADVICE Spend some time using any software or website you ask the students to use. You will weed out some products this way, and you will learn the ins and outs of the ones you keep. Build routines around technology use so that students do not see a computer as free internet time, but as productive learning time. Take advantage of the data features; the knowledge they provide will help you plan more effectively.

The screenshot shows a webquest titled "Probability Introductory Quest for GSE Analytic Geometry". The page includes a navigation menu on the left and a main content area with a video thumbnail and descriptive text about probability concepts.

Webquest for students who showed readiness to begin independent work.

The screenshot shows a digital form titled "STANDARDS TROUBLE SPOTS". It includes dropdown menus for "GRADE/See" and "STANDARD DOCUMENT: Standards of Excellence: Academic...". Below these are sections for "MISSING QUESTIONS FROM THIS ITEM TYPE" and "Ways to help 5 or more students at once...". A geometry problem involving triangle congruence is displayed.

Some data that helps differentiate target instruction.

iPads for Student Engagement in Biology

by Savannah Bell

2016 Cohort | Kennesaw State University | Woodstock Middle School (Woodstock)

SUMMARY My Goizueta-Woodrow Wilson Enrichment Microgrant went towards purchasing iPads for my classroom. Modern education has taken technology and run with it full speed, but many schools do not have the funding to provide each classroom with the means to utilize the vast expanse of technology available. This is what inspired me to write my proposal, and the goal of my project was to explore the effectiveness of my lessons with technology in comparison to those that did not use technology.

IMPACT ON STUDENTS Throughout this year, I have seen a trend of increased engagement as a direct result of using the iPads. During these lessons, I had more questions, more “light bulb” moments, and even students who asked if they could keep exploring the topic after we were done with the lesson. In addition, the results I saw in the formative and summative assessments were higher for the standards that were taught using the iPads.

EFFECTIVENESS IN TEACHING The iPads I purchased with the microgrant have allowed me to integrate much more research and project-based assignments into my lessons. Even during lessons that are driven by in direct instruction, I have been able to integrate formative assessments to gauge the students' grasp on the content. Using that feedback, I can adjust the rest of the lesson based on what the students need.



An iPad app lets students explore plant and animal cells.

IMPACT ON EDUCATORS I have been able to collaborate with the other teachers in my department and share the lessons I put together. In the future, I plan to keep sharing the successful lessons I create using the iPads in my classroom, as well as making them available on lesson sharing websites.



Nearpod makes instruction-based lessons more interactive and provides active feedback.

WORDS OF ADVICE I would tell educators looking to implement this same project in their classroom not to be afraid to experiment with the lessons involving the iPads. There were times when I did not know exactly how the lesson I had put together would come across, but the results were spectacular. There will always be some that do not go as planned, but the trial and error was well worth discovering what techniques and lessons worked with my students.

Learning Technology for Geometry

by Brian Moler

2015 Cohort | Columbus State University | Discovery High School (Lawrenceville)

SUMMARY Technology resources are not only hard to come by at the school I teach at, but also in limited supply. We are a relatively new academy high school in Gwinnett County (this is our third year). It is very difficult to get computer resources or lab time to integrate technology into the geometry curriculum, yet many such resources are available to further student learning and engagement. GeoGebra is just one such great example of ways technology can be integrated into the curriculum, with great GeoGebra demonstrations available to enhance student learning of the academic standards. Discovery High School is a Title I school so not only does the school lack available resources, but also many students are unable to afford the technology and calculators that students in other more affluent schools are able to have. Classroom technology can help differentiate learning by making it more personalized—which is important as young learners today are accustomed to personalized content and instantaneous communication. Another benefit of technology use in the classroom is real-time assessment. Mobile technology in the classroom allows for embedded assessment. It is possible to create content that integrates a quick assessment to determine student comprehension and knowledge while collecting important data and analytics to drive instruction. A large number of electronic resources are available, including instructional games, interactive websites, and other digital tools, that can give students ownership of their learning and the ability to proceed at their own pace through their own learning styles. Technology is the way to transform learning and can have great impact on the current state of education.



Looking for a review activity on transformations to prepare students for the exam.

IMPACT ON STUDENTS Given the short amount of time I have had my materials, I have not yet seen many changes toward student dispositions this year. However, moving forward into the coming year, I hope to see greater student engagement by using the iPads to complement the instructional time through more blended instruction. I also hope to see improved course scores by utilizing the iPads for remediation and making the instruction more student-focused and differentiated. Over the course of implementation, I have found a number of ideas for making instruction more interactive (Nearpod, Recap, FlipGrid, and Edpuzzle) and also differentiated (IXL and ThatQuiz).

EFFECTIVENESS IN TEACHING While the Goizueta-Woodrow Wilson Enrichment Microgrant has given me access to technology that I would not have been able to have to bring into the classroom otherwise, it has made a greater impact on how I plan for my instruction and the resources that I utilize. Just because technology is utilized for instruction does not mean it is necessarily meaningful. When I am planning for instruction, I try think about how the lesson could benefit from the use of technology. Some of the questions I use when I am going through this process have been as follows: What am I trying to gain through the use of technology? Is it meant to serve as an extension of the lesson? Is it meant as differentiation? Am I using it as a means of formative assessment? In addition, the way students learn today has fundamentally changed. Technology is a part of daily life for them, and teaching and learning needs to change to address their needs. Using technology and a blended-learning environment is one of the ways to continue to meet the needs of our students today. The microgrant has given me the support I need to bring technology into the classroom to continue to meet the needs of my students and the way they learn.

IMPACT ON EDUCATORS I have shared my experiences from writing my microgrant proposal with others in my school, within my department, and on my course team. I have worked with two other teachers who are hoping to write grant proposals for their own for resources. Also, I have shared with other teachers on my course team ways that we can transform the way we are teaching our students. Moving into next year, there are a couple teachers on our team that would like to use a flipped classroom model more to better meet the needs of our students. I am hoping that this will lead to more time to extend and enrich the learning that has already taken place using the flipped classroom model. I would also like to present to the Fellows in my cohort, and others when we have our next professional development opportunity through our partner university, so that they all are able to gain from my experiences.

WORDS OF ADVICE Some thoughts regarding implementation and things I would have done differently: I would encourage anyone thinking of bringing technology into their classroom to research what is available and think about what they are looking to gain with the technology. Also, I would encourage them to seek the guidance of the school or district technology personnel. When I started looking into what I wanted to use my technology for, I sought the advice of my Local School Technology Consultant (LSTC) and Technology Support Individual (TSI). This paid off as I got good feedback and ideas prior to implementation of my project. Also, I was able to avoid some setbacks with the setup of my devices on the school's network and gain a dedicated account sign-on for each device to avoid network issues. In retrospect, I wish I had applied for round 1 funding instead of round 2 so that I could have implemented my project going into the school year. By the time I purchased my devices and got them set up, I had little time left this year to really begin to use the devices and see what I had hoped to see.

Goizueta–Woodrow Wilson Enrichment Microgrant

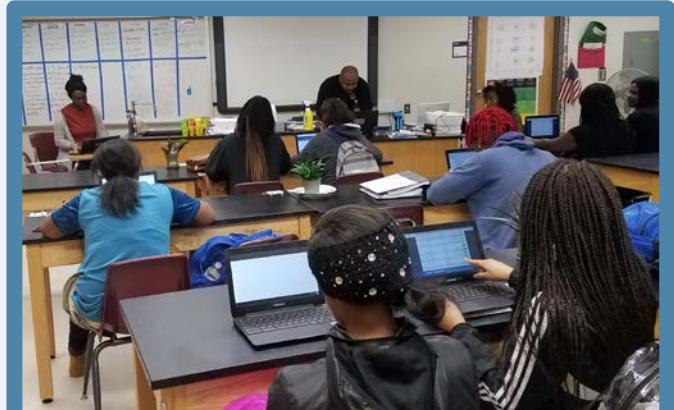
Aquaponics and Urban Planting

by Monica Cooper

2017 Cohort | Georgia State University | Maynard Jackson High School (Atlanta)

SUMMARY My Goizueta-Woodrow Wilson Enrichment Microgrant proposal was written for STEM equipment to support science activities in an urban school: 12 computers (plus computer cart), aquaponic system, plants, seeds, dirt, etc. I knew that I would not ever be the science teacher who would have lab pets in the classroom, but I still wanted to bring life to my students' classroom experience. If the students could take the knowledge they learned in class and apply it outside of the school, even better. Chromebooks were necessary for research and keeping a log. The goal of the project was to make the students aware of the possibility of urban planting, combining an aesthetic fish tank and plants/flowers with the potential to become self-sustaining. My project was a seed that was planted in the beautiful minds of my students as food for thought.

IMPACT ON STUDENTS Our project took place during the ecology unit in 9th-grade biology. My students were able to use the Chromebooks to do research and to keep a log of the project that consisted of creating teams and delegating responsibilities, planning and conducting research, building the aquaponics system, and planting seeds in reusable containers. Students had fun planting seeds and watching them grow, and I think that expanded their horizons. One gifted student with an IEP, who is normally having a hard time with adequate behavior, very much enjoyed building the aquaponics system.



Students using Chromebooks for science activities.



Sweet peas planted by students.

EFFECTIVENESS IN TEACHING

Chromebooks/computers/tablets are essential in research, formal and informal assessments, differentiation, and personalized learning. A Google form quiz gives instant feedback to both students and teachers. The teacher can reteach if there is the need to, and students are motivated to do better when they see their grade in real-time. The aquaponics system was more on the fun side, but also another way to approach urban planting.

IMPACT ON EDUCATORS

Technology integration in my lessons became an example for other teachers in the Science Department. I shared with them the websites I used for virtual labs, explained how to use Google slides that are made once and used for all classes, and demonstrated how to use Google forms to give quizzes and collect data instantly. The ornamental plants were in our classroom from the time I joined and it was a way to start conversations about environmental and ecological topics.

WORDS OF ADVICE

Try something new even if you don't necessarily know everything. In the beginning I thought that my project was way above my head, but students started to be interested and helped more than I would have imagined.

3-D Printers in the Math Classroom

by Michael Peterson

2017 Cohort | Georgia State University | Arabia Mountain High School (Lithonia)

SUMMARY This Goizueta-Woodrow Wilson Enrichment Microgrant project was focused on assisting and supporting instruction using technology to demonstrate applications of mathematical concepts in a manner that engages and expands the creative possibilities for students. I chose to use the microgrant to obtain 3-D printers for the classroom. The printers would serve multiple purposes in supporting me and my cooperating teacher in integrating concepts that occur throughout multiple courses, such as conics, surface area and volumes, rotations and transformations, probability, and many more. The goal was to use the 3-D printers for Project Learning Teams with several specific projects already in mind at the time of applying for the microgrant. The projects came to mind from another Woodrow Wilson experience that placed me in an elementary school for a day. That Dekalb County school, Henderson Mill Elementary, is the state's first STEAM-certified school. The students were actively engaged in project learning using 3-D printers in most of the classrooms I visited. I spoke with the staff about their experiences with various 3-D printers and was convinced that I would also want to use the 3-D printers they recommended. I envisioned adopting and adapting projects to fit the high school math environment with a long-range desire to develop a collaborative relationship with the school.



Creative designs.

IMPACT ON STUDENTS The students are always excited when they have time to work on 3-D print designs. Seeing examples of students using mathematical concepts from class lessons to perform calculations and try out their designs in CAD software is especially rewarding to me as the instructor and provides many instances where students show their creative work proudly. The students were actively engaged in using the 3-D printers to create tools to further develop their understanding of mathematical concepts and procedures. The primary experience was in developing 3-D printed game pieces for use in mathematical content games developed by student project teams. One or more of the games will be showcased and used in future classes as instructional tools.



3-D printers.

EFFECTIVENESS IN TEACHING The microgrant allowed me to have a vision, obtain necessary resources, and implement the vision almost exactly as planned. I say almost exactly as planned because logistical challenges not directly related to the vision required that I become even more flexible as an instructor. Why was never a question, but how, when, and where created new and interesting opportunities!

IMPACT ON EDUCATORS The projects that the students have created have been shared with other teachers and administrators. They all have been impressed and expressed enthusiastic support and gratitude for bringing 3-D printing technology into a regular classroom to support and enhance instruction.



Game making time!

WORDS OF ADVICE There is a substantial time and administrative commitment required. Print projects take time and must be carefully planned. The 3-D printers are nearly flawless, but they are complicated machines that require you to learn how to perform various maintenance or corrective tasks. Also, be sure to consider the classroom environment. The printers I selected are relatively quiet and enclosed, so the instructional time is not interrupted with distracting sounds even with all printers operating at the same time.

Sphero Robots in a Computer Science Class

by Tareha Hopkins

2016 Cohort | Piedmont College | South Gwinnett High School (Snellville)

SUMMARY I bought a class set of Sphero robots with my Goizueta–Woodrow Wilson Enrichment Microgrant. I used them to create a more hands-on experience during the robotics unit of my Intro to Digital Technology course. I also used them for practice and enrichment of students' JavaScript programming skills.

IMPACT ON STUDENTS The robots got students out of their seats, experimenting and asking questions. Teaching and learning was very hands-on. There were high levels of engagement during this unit that lasted into the next unit. The overall culture of the classroom changed in a positive way. Students became even more outspoken and comfortable with working as a team. Students completed various assignments using the robots, with all the assignments following the Project-Based Learning model. The students began to get used to less detailed instructions, rather than a very detailed rubric and lots of resources. This opened the door for higher-order thinking and problem solving. The engineering teacher at my school mentioned that many of my students have requested that he add the robots to his curriculum as well.



Students using Sphero robots.

EFFECTIVENESS IN TEACHING

The devices that I have obtained through the Goizueta–Woodrow Wilson Enrichment Microgrant Program allow me to better engage students by creating more interesting, hands-on lessons.

IMPACT ON EDUCATORS

I share my devices with other teachers at my current school and with teachers at the school where I did my clinical experience last year. My principal plans to post pictures of my students using the devices on the school's website to promote our computer science program.

WORDS OF ADVICE

My advice is to use the devices to enhance the lesson and not as the lesson. I would also advise teachers to create and teach rules for usage before introducing the devices.

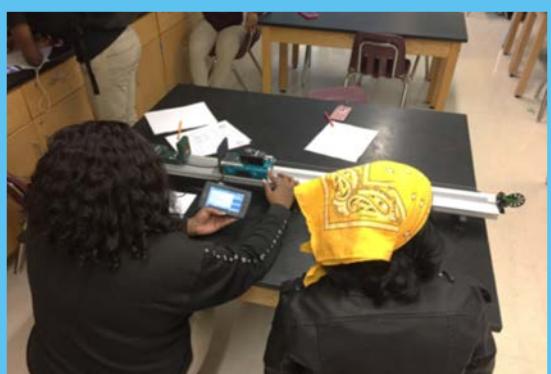
Equipment for a Taste of College Physics

by John Alberts

2017 Cohort | Georgia State University | Maynard High School (Atlanta)

SUMMARY Students at my school had limited access to physics equipment. I wanted not only to engage students in STEM, but also to provide them with opportunities to engage in interactive labs and real-time data collection and analysis. My Goizueta-Woodrow Wilson Enrichment Microgrant was written for Vernier track and cart systems, force sensors, motion detectors, LabQUEST2, and photogates. This equipment would not only allow students to engage in STEM labs, but also expose students to equipment that they would see in a college physics class.

IMPACT ON STUDENTS Through using these materials to engage in labs related to force, motion, energy, and momentum, students expressed more interest in physics and that they felt they had more access to STEM. At first, students expressed a mix of frustration and excitement in using these materials. Students had to learn not only how to perform the lab, but also how to use the equipment. After students had some time to become familiar with using the equipment, they expressed excitement and joy in using it. Knowing that they were using college-level science equipment to engage in experiments, they felt as if they had more access to STEM.



Students using Vernier LabQUEST2, dual range force sensor, motion detector, and track-cart system to investigate the relationship between force, mass, and acceleration.

EFFECTIVENESS IN TEACHING The materials from this microgrant have supported me in teaching modeling-based physics lessons, lab design, data collection, and data analysis. I learned how to better lead students in designing their own labs and how to evaluate them in this process. I also learned how to give students time to work with equipment and figure things out themselves. The inclusion of these Vernier materials in my instruction has led to more student-centered and modeling-based teaching.

IMPACT ON EDUCATORS I have been able to collaborate with my mentor teacher on the use of the Vernier materials. I have also been able to share the ways in which I have used the material and how they have affected my teaching with others in my M.A.T. program. In the future, I will share the ways in which I use the materials with fellow science teachers, instructional coach, and principal at my school. Outside of my school, I will share the ways I use the materials with other science teachers through networking at conferences. In the future, I would like to create a website where I list what I do, how to do it, and any resources needed to benefit future physics teachers.

WORDS OF ADVICE There are so many great resources for science education. Some resources have been around for hundreds of years and others are currently being developed. It is important to collaborate with a wide variety of educators in your content area to be aware of what is available and what will best suit you and your students. Once you have obtained materials, it is important to introduce students to the style of teaching in which you will use the materials and to allow them time to become familiar with the materials. It can also be great to ask students to design their own labs and come up with their own ideas of what they could use the equipment to investigate.

DNA Electrophoresis and Sickle Cell Anemia

by Mary Wagner

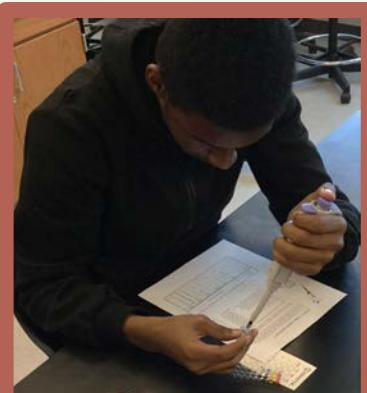
2016 Cohort | Georgia State University | Chamblee Charter High School (Chamblee)

SUMMARY The word biotechnology is frequently used in the media and in classrooms, but students have trouble conceptualizing what biotechnology means due to lack of personal exposure. Equipment used in biotechnology is expensive, and few schools have access to it. In genetics, a major freshman biology unit, DNA electrophoresis makes it possible to examine genetic variation, comparing inheritance of alleles for different traits. Electrophoresis is a common biotechnology tool, easily accessible to high school students, that allows them to develop skills used daily in research labs as well as investigate heredity phenomena through DNA analysis. The purpose of this Goizueta-Woodrow Wilson Enrichment Microgrant is to purchase DNA electrophoresis equipment, supplies, and educational kits to expose students to biotechnology and cultivate their interest in genetics.

IMPACT ON STUDENTS In a survey before the use of the electrophoresis equipment, I asked students to agree or disagree with statements about the use of labs in biology class and their knowledge of biotechnology. Most of the students agreed that labs helped them learn biology better (89%) and that they were more engaged when we did labs (84%). Only 31% said they knew what biotechnology was and only 33% were interested in future classes or careers involving biotechnology. As we wrap up the biotechnology/genetics unit, which used the electrophoresis equipment for a case study involving sickle cell disease, I will survey the students again and compare their answers to the pre-lab survey.

EFFECTIVENESS IN TEACHING The funding allowed me to purchase enough electrophoresis equipment, simulated DNA kits, and micropipettes for my entire class to participate in an inquiry lab on inheritance of sickle cell disease. This was truly 3-D learning, as prescribed by the Next Generation Science Standards.

Students investigated the phenomena of sickle cell disease, which affects many of them either personally or through family members and friends, and through investigation were able to better understand modern biotechnological tools used for genetic analysis. This project involved critical thinking and analysis of many different types of information bringing together concepts from our unit study on the cell, genetics, and heredity, and even evolution, as we looked at the protective effects of the sickle cell mutation against malaria. I was able to provide an authentic scientific experience for the students due to the funding from the microgrant, and to expose the students to biotechnology, a growing industry in the Atlanta area and potentially a career path that they may not have previously considered.



Student pipetting using micropipettes and a kit designed for small volumes.



Consistent colors and size show successful replication of pipetting small volumes.



Electrophoresis equipment, micropipettes, and DNA kits.

IMPACT ON EDUCATORS I have been able to share the electrophoresis equipment and kits with my entire department. In particular, the collaborating teacher whom I co-plan with has implemented the same case study using the equipment and kits from my microgrant. Thus, I have been able to influence more students at Chamblee and directly affect another teacher. I am making the equipment available to the other biology teachers so that they can run a demo gel in their classes. I intend to share the case study of sickle cell disease and corresponding lesson plan with teachers at my school, in my district, and other WW Teaching Fellows.

WORDS OF ADVICE I would recommend purchasing consumables in addition to the actual equipment. Things like the simulated DNA kits and pipette tips can get expensive and are needed for the lab. Shop around for equipment. I purchased my pipettes from Amazon at half the cost of those at Edvotek, but I did purchase the electrophoresis equipment from Edvotek as it fit my needs best. I would also recommend to purchase enough equipment (as funding allows) so that you can have groups less than 4, with 2 being ideal, which allows for every student to have a substantial turn using the equipment.

DNA Fingerprinting and Student-Centered Learning

by Shamika Crawford

2016 Cohort | Georgia State University | Miller Grove High School (Lithonia)

SUMMARY As a science teacher, it is important to me that my students know and feel that they are scientists. The materials that I purchased with the Goizueta-Woodrow Wilson Microgrant are gel electrophoresis chambers and power supplies, adjustable micropipettes, DNA fingerprinting kits, and other associated equipment. I felt that using these materials would give the students more confidence in their abilities to do science and, in turn, increase their affinity to pursue careers in science-related fields. The new Georgia Standards of Excellence (GSEs) require that we (as teachers) teach students how to ask questions, evaluate/argue from evidence, create, and communicate information—all outcomes that require higher-level thinking from the students, rather than just rote memorization. Standard SB2.c., for example, states that students should be able to "ask questions to gather and communicate information about the use and ethical considerations of biotechnology in forensics, medicine, and agriculture." This equipment will help the students master this standard by giving them hands-on experience using biotechnology to carry out investigations about how DNA technology/fingerprinting can be used to identify suspects in a crime (and/or even to study the relationship between individuals).



Student loading agarose gel for electrophoresis.

IMPACT ON STUDENTS The most important change that I have seen in my students, as a result of the project, is the way they view themselves in relation to science, particularly genetics and biology. As a science teacher, I want my students to understand that they are scientists. It is important for them to know that they don't have to use expensive machinery and fancy tools to be considered a scientist; however, I would also like them to have a glimpse of some of the technological advances that are available for scientists to use, and to also have experience working with professional, quality equipment that is used in research laboratories. Before beginning the project, I told the students that they would be using expensive equipment that actual scientists use in laboratories around the world. While they were completing the project, the students were conscientious and took the project very seriously. Using all of the new equipment led the students to ask more questions than they had asked during any previous labs. They also wanted to learn how to use everything on their own instead of allowing other students or myself do it for them. In the post-project survey, one student said that he felt like he was a scientist because he "did real science like adults and it was easy." This response made me feel that the project was successful at altering my students' perspectives of themselves as scientists.

EFFECTIVENESS IN TEACHING Before completing the project, I have heard from other educators at various events and conferences how important it is for students and teachers to ask questions. I realize that, in my classroom, I am usually the one asking the students questions, with them memorizing information resulting from me asking the same question repeatedly in different ways. When completing the project, I realized that the students were learning more in a shorter period because they were asking more questions, and I was able in turn to ask them more questions to help lead them to the answers that they were seeking instead. This helped me finally realize why so many educators stress the importance of not only teachers asking questions, but also students asking questions. Constant engagement is vital in the science classroom because it keeps the students asking questions, which in turn, keeps them learning.

IMPACT ON EDUCATORS I have already begun sharing my ideas outside of my classroom by inviting other teachers at my school to view the project as my classes were completing it. Other teachers in my school have asked if they can use the materials in their classrooms with their students next semester. One colleague, the forensic science teacher, seems extremely interested. In my classroom, we treated the project like an investigation in which we were trying to determine which of five suspects committed a crime. DNA fingerprinting through agarose gel electrophoresis can be used to determine which suspect was at the crime scene. The forensic science teacher felt that the project would be excellent for her curriculum.

WORDS OF ADVICE Some things that other educators should consider when trying to complete the same project are time and assistance. Time is important to think carefully about because this project took a lot of time to set up. It also took time to teach the students how to use the materials properly, especially since they are fragile and expensive. One thing that helped with time: I set up a practice day for the students to be able to learn how to use the equipment with some inexpensive materials before using all of the more expensive ones. The day before the project, I explained to the students how to use micropipettes and also did a "mock trial" of the lab using food coloring instead of DNA. The mock trial helped the students understand how to transfer liquids, load gels, and run gels. The lab the next day would not have run as smoothly and as quickly as it did if we hadn't practiced the day before. In addition to time, having assistance preparing for the project is vital. Before the lab, I had some students help me make gels, prepare enzymes and DNA samples, and set up lab stations. If I had not had these students help me, it would have taken me much longer to get everything set up for all of my classes. If you can get some students or maybe some other teachers to help after school, it would make implementing the project much easier.

Goizueta-Woodrow Wilson Enrichment Microgrant

PASCO Probes and Student Engagement in Chemistry

by Daron Martin and Derikson Rivera

2015 and 2016 Cohort | Piedmont College | Lanier High School (Sugar Hill) | Meadowcreek High School (Norcross)

SUMMARY This year I applied with Derikson Rivera to order sets of PASCO probes. I was personally able to buy four sets of the Chemistry Starter Packs, which included voltage, conductivity, pH, and pressure sensors. As a teacher at an established STEM academy, I am always looking for opportunities to further my students' experience with advanced technology. These probes afforded me the ability to accomplish three major goals. The first goal was to increase student engagement in the lab. Large class sizes and limited equipment make it difficult to keep students engaged in the lab. Secondly, I wanted to increase students' ability to analyze and discuss data in various forms. The push in Gwinnett County Public Schools for science literacy makes it imperative that students are able to employ data presented in various modes. Finally, I wanted to use advanced technology to foster positive dispositions towards the use of science, technology, and experimentation.

IMPACT ON STUDENTS Teaching at a STEM academy typically means the vast majority of my students come with a positive disposition towards STEM; however, the use of the PASCO probes has improved almost all of my students' attitudes about lab work. Students are excited to not only use foreign technology in the lab, but also to use their own cellular devices as the mode for saving, sharing, and collecting data. Students could not wait to replicate their trials because it meant that they could manipulate the equipment themselves. The probes fostered teamwork and collaboration, attention to detail, analysis of data, and discourse about the content. While all of these are staples in the laboratory setting, my observations revealed that students were engaging more deeply than was previously seen in my classroom.

EFFECTIVENESS IN TEACHING This year was the first year that our district's standards incorporated the Next Generation Science Standards. The PASCO probes allowed my students to launch investigations with a level of accuracy that we could not previously achieve with the dated tools in our storage closet. Ultimately, students saw firsthand

the benefit of modern technology over other methods, and were able to assess and discuss their benefit. As an educator, I was able to use the materials to help students construct, understand, and link concepts together for a greater depth of knowledge. For example, students normally understand the connection between the pH scale and ion concentration just from math and facts. My students were able to launch an investigation of that connection through testing pH, conductivity, and visualizing the logarithmic changes that occur as you move through the pH scale.



Students using probes to investigate the relationship between ion concentration, conductivity, and pH.

IMPACT ON EDUCATORS I have been able to share my findings, labs, and ideas weekly with my chemistry course team. As we seek ways to address our standards authentically, these materials allow me to contribute ideas that will impact our entire school. I have also been afforded the opportunity to share my findings, lab protocols, and ideas with members of other cohorts. This collaboration will further the impact of the microgrant to the district, and potentially around the state.

WORDS OF ADVICE My biggest piece of advice for other educators seeking to implement this project is to comb through your standards and look for opportunities to deepen student knowledge. Often we think that our explanations are the only way to help students understand difficult concepts. The best method is to build ways for students to discover the concept authentically, while facilitating their construction of the accurate conception.

PASCO Sensors for Lab Work

by Tiffany Parsons

2016 Cohort | Georgia State University | Southwest Dekalb High School (Decatur)

SUMMARY My Goizueta-Woodrow Wilson Enrichment Microgrant was designed to help create a 21st-century classroom in which students can relate scientific concepts to their lives and make long-term connections to the real-world phenomena they encounter every day. I was inspired by the PASCO workshops I attended at the NSTA National Conference in 2017 and knew I wanted to bring these same ideas to my classroom. PASCO has developed several wireless Bluetooth sensors which can connect to computers and other electronic devices to record data for chemistry and physics laboratories. Research has revealed that urban schools that promote technology-rich inquiry science show an increase in content and inquiry gains. The goal of my project was to provide my students access to this type of technology to help ensure they are scientifically and digitally competent, while also being able to visualize and apply the science concepts being taught.



Students become more engaged in learning science through opportunities to use contemporary lab equipment.

IMPACT ON STUDENTS

I've noticed that students are more engaged in the laboratories and are intrigued by the wireless probes. I feel that students are able to make more connections to the material they have learned in class by utilizing the equipment. I also believe the PASCO equipment has made my students more interested in STEM and I find that students ask more often when we are going to do labs in class.

EFFECTIVENESS IN TEACHING This microgrant has had a tremendous impact on my teaching. The PASCO equipment has inspired me to develop more hands-on activities to help students understand science through the use of technology. I have noticed that during laboratories I am able to act more as a facilitator of learning, which is my ultimate goal as an educator. I have been able to transform my classroom into a place where students can explore. Having this new equipment has also challenged me to become more innovative and creative in order to maximize its uses for the PASCO equipment.

IMPACT ON EDUCATORS My mentor teacher has been able to see how my new equipment has impacted my classroom and is now advocating on my behalf for our school district to adopt PASCO textbooks and laboratory equipment. I plan to lead a Professional Learning session during our common planning to share with my Science Department about how the microgrant project has positively changed the dynamics of my classroom.

WORDS OF ADVICE Before letting your students perform any laboratory investigations, you must perform the investigations yourself. Brand new equipment can be difficult to work with if you have never used the technology before; therefore, figuring out beforehand how to use the equipment is a must. Also, definitely, have patience and recognize that working with this equipment will take time for both you and your students. Lastly, please understand that PASCO technical support will become your best friend and do not get frustrated if the lab did not go as planned because, in the world of science, things never seem to go as planned anyway.

Probeware and Student-Centered Chemistry Learning

by Natasaskia Wayne

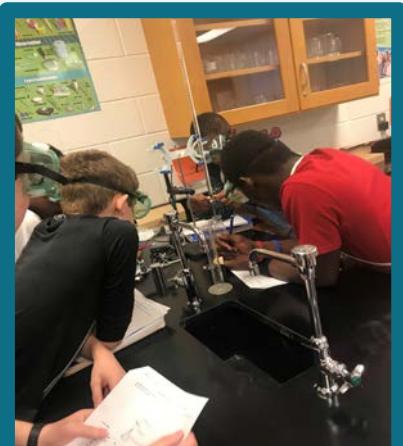
2016 Cohort | Kennesaw State University | Mountainview High School (Lawrenceville)

SUMMARY Before submitting the Goizueta-Woodrow Wilson Enrichment Microgrant proposal, I thought of ways I can enrich my classroom as a whole and just with one project for the year. Last year I was awarded funds to purchase lab equipment from Vernier Software. The equipment included four Deluxe Chemistry Kits. The kits came with probeware for various units and topics in chemistry. The probeware is advanced with many different capabilities and inquiry labs. My goal as a new teacher of record is to teach chemistry as an investigation. I wanted to convert the lessons and PowerPoints I've used during my year-long clinical experience to engaging, student-led lessons. This year I have seven lab tables, so I wrote a proposal for three more kits so that each lab table can have a set of probes. Throughout the year, I was able to engage my students in labs where they discovered the content instead of being told the information. I also was able to purchase AP Chemistry flash drives for practice and supplemental information.

IMPACT ON STUDENTS As a result of the inquiry lesson using the Vernier Software, my students improved their critical thinking skills. In the new science standards, students are required to analyze data, develop and execute investigations, and construct arguments and models. All of these new science practices require the classroom to become an environment where students direct their own learning. The nature of the class is more challenging; however, my students outperformed other classes on the county district assessment. My students are far more engaged in the classroom and they have created a fun learning environment. Towards the end of the year, students are able to ask investigating questions and asking me if they can do labs to figure out the answer to their questions. Some investigations included titrations, conductivity, and measuring calories in food snacks.



Determining the calorie count of several snacks and comparing experimental values to what is printed on labels.



Determining the concentration of bases in various different brands of stomach relief medicine.

EFFECTIVENESS IN TEACHING My teaching style has evolved. I have been forced to let my students control the classroom, in a way. I have become more creative when planning lessons and assessing the students. As a result, the students have had more of a choice and voice in the classroom. When students are able to design their own investigation, they are demonstrating their knowledge, which is a form of assessment. School should not just consist of PowerPoint notes, worksheets, and tests. Each day should be engaging and new for students. It is good to use several different strategies in the classroom. The unknown keeps students interested in the class and on task.

IMPACT ON EDUCATORS I have shared my lessons with the teachers on my team. However, many of the educators were apprehensive about using the lessons in their classroom. I have heard comments such as, "that requires so much work," and "my kids will never get that." My goal is to show how much my students are understanding and applying the concepts, not just memorizing facts. Even though designing such lessons requires a lot of work on the back end, the reward is the ability to be more hands-off in the classroom.

WORDS OF ADVICE I have encountered several educators who are apprehensive about stepping away from PowerPoint lectures. At first, inquiry lessons can feel out of place, but the key is to try different approaches to figure out what works best for you. The students will feel out of place as well during the first several classes where they are asked to plan and carry out investigations. On the bright side, both the students and the teacher will become more comfortable and the students will be able to critically think through any assessment.

Pocketlabs for Data Collection in Physics

by Wesley Queen

2017 Cohort | Kennesaw State University | Cherokee High School (Canton)

SUMMARY My Goizueta–Woodrow Wilson Enrichment Microgrant project was designed to enable my students to quickly and efficiently collect data, and be able to analyze and interpret that data in real-time. I purchased Pocketlab devices and tablets in order to accomplish this. The Pocketlabs provide the capability to measure position, acceleration, angular velocity, magnetic fields, temperature, light intensity, and other physical quantities. They connect via Bluetooth to the tablets so students can read the data in "real-time" as it is being collected. The data can then be stored and exported to Excel for deeper analysis.

IMPACT ON STUDENTS My students immediately gravitated towards the Pocketlabs once we began to use them. On occasion, we collected data in multiple ways and it was clearly the preference of the students to use the Pocketlabs to collect and interpret data.

EFFECTIVENESS IN TEACHING The funding from the Goizueta–Woodrow Wilson Enrichment Microgrant Program has equipped me for years to come. I have only scratched the surface with what can be done with the materials I have received through the microgrant. I expect to be able to gradually increase the incorporation of the Pocketlabs into my instruction as time goes on.



Students collecting the acceleration of sliding masses on inclined planes using both Pocketlabs and photogate timers.

IMPACT ON EDUCATORS

I have used the Pocketlabs in collaboration with other physics teachers at my school and demonstrated to other teachers the capabilities that they provide. They were used in another teacher's class on the study of angular velocity.

WORDS OF ADVICE My advice to other educators using Pocketlabs would be to either purchase or 3-D print the carts designed to be used with the Pocketlabs. This will increase the ease at which the devices can be incorporated into labs and lessons.

Sensors for Fieldwork

by Hannah Tompkins

2017 Cohort | Georgia State University | Arabia Mountain High School (Lithonia)

SUMMARY My Goizueta-Woodrow Wilson Enrichment Microgrant was centered on the purchase of a class set of Vernier LabQuest 2 interfaces and sensors to be used in my 9th-grade biology classroom. These interfaces helped familiarize students with laboratory practices, specifically data collection and data analysis. Students were also engaged directly in observing scientific phenomena. Instead of simply explaining or modeling the phenomena, using the probeware allowed students to engage in hands-on investigations and experiments where they collected data for a number of different variables. This experience helped students observe and understand the phenomenon they were studying. Ultimately, the goal of the project was to familiarize students with the true nature of science—how science actually works from designing investigations to data collection and analysis.

IMPACT ON STUDENTS Since implementing this project, I have seen my students becoming more interested in STEM. I tried to use this project to address students' misconceptions about the way science works. I wanted to show students that science is a creative and fun process! As a result, my students are beginning to see STEM subjects as more accessible. For example, in one high-impact activity, students assessed the water quality of the school's retention pond. This activity allowed students to design and carry out their own investigations with real-world applications. My hope is that continuing to do these types of investigations will spark students' interest in pursuing careers in STEM fields.

EFFECTIVENESS IN TEACHING This project has greatly improved my teaching and has increased the opportunities I have had to engage students in inquiry. Having the LabQuests as a resource has allowed me to plan more hands-on investigations in the classroom. It has also given me the confidence to let the students have more freedom in planning and carrying out their own investigations. Having a variety of probes and sensors for students to choose from in developing investigations has given them a more realistic perspective on what it means to do scientific research. It also allows me to incorporate lessons and discussions that focus on various aspects of the nature of science.



Ninth-grade biology students conducting a water quality analysis of their school's retention pond.



Students use different probes to test the conductivity, dissolved oxygen, and pH of the pond.



A LabQuest 2 interface and conductivity probe.

IMPACT ON EDUCATORS I plan to measure and share the outcome of this project by surveying students regarding how the use of the probeware affected their understanding of the nature of science, their engagement in class, and their overall understanding of the scientific phenomenon and concepts. These responses will be shared with the Goizueta-Woodrow Wilson Microgrant Program and also with my fellow graduate students in our Nature of Science course at Georgia State University. I also plan to share the outcomes of this project with my future colleagues as I enter into a classroom of my own.

WORDS OF ADVICE To any educators looking to implement a similar project, I would definitely recommend talking with Vernier early and often. The Vernier representatives were very helpful in recommending useful products and getting prices reduced. I would also encourage educators to not be afraid of giving your students a little more freedom in using the probeware once you have it—let them work through the process of trial and error to design their own investigations!

KidWind Turbines, LabQuest2 Testing, and Engineering Basics

by Gabrielle Arondel

2016 Cohort | Kennesaw State University | Tucker High School (Tucker)

SUMMARY With last year's Goizueta-Woodrow Wilson Microgrant Program, I was able to purchase LabQuest 2 interfaces and probeware. This year, I was able to purchase additional interfaces and probeware to accommodate large class sizes. I also purchased KidWind energy kits to construct wind turbines. The overall goal of the project was to create a hands-on learning experience aimed at exploring clean energy sources with the KidWind kits and solar panels while meeting the new Georgia Standards of Excellence, which more prominently feature renewable energy. Students were tasked with designing, building, testing, and modifying their own blades for a wind turbine to produce the most power in their class.

IMPACT ON STUDENTS Since using the probeware and wind turbines in class, I have observed an overall positive change in my students being more engaged in their own learning. At the beginning of the school year, I was met with some resistance from my students to a more student-centered learning style. The project with the Vernier equipment demonstrated to my students that I trust them to guide their own learning and has instilled confidence in them, which is apparent in their overall behavior and engagement. Using the probeware allowed my students to experience the content in an authentic way, rather than just reading, watching, and hearing about it. When asking students about the project, they have stated they enjoyed learning about the material in a real-world context and experiencing it first-hand. While they may not necessarily want to become scientists, they find science class enjoyable and find purpose in it.



Students testing the power output of their blades on the LabQuest 2 before making modifications.

EFFECTIVENESS IN TEACHING The funding for the project has allowed me to incorporate the science and engineering practices into my teaching in a meaningful way. While we often incorporate the scientific practices in labs, the project was the first time I had truly incorporated the engineering practices. Overall, the use of the engineering practices was successful and I am pleased with how I implemented the project for the first time. However, I have learned that the engineering process needs to be taught more explicitly. The project has allowed me to take a risk and try something new that I would not have access to otherwise.

IMPACT ON EDUCATORS As I share other teachers' classrooms, teachers had the opportunity to observe my students throughout the project. I was also able to share the lessons with other educators in the science department. Outside of our school, I have shared the project with other science Teaching Fellows in my WW cohort. Lastly, I am part of a group for new teachers in Dekalb County. I plan on sharing my project with new Dekalb science teachers at our last meeting for the year.

WORDS OF ADVICE Whatever your concerns, you can do it! I was hesitant with the project at first as I do not have my own classroom and there is a lot of equipment to set-up and break down to move from room to room. I will admit it was a lot of work to move everything, but the students recognized that and were very helpful in cleaning up and transporting the materials down the hall. I was also concerned with students being absent as the project was going to take multiple days. While there were some students out a few days, they were able to jump right back into the project when they returned. Despite the stress of implementing the project and the extensive prep-time, it was well worth it and I would do it all over again.

Hands-On Models of Cell Structures

by Dhwan Patel

2016 Cohort | Piedmont College | North Cobb High School (Kennesaw)

SUMMARY The goal of this Goizueta-Woodrow Wilson Enrichment Microgrant was to expand and enhance understanding using hands-on models for 9th- and 10th-grade biology students. Through the microgrant, I was able to purchase animal and plant cell models, models of stages of mitosis and meiosis, a mitosis construction kit, microscope slides for 10 different cell types, a model of chloroplasts and mitochondria, and 20 packs of PTC strips. These models allowed students to touch, identify, differentiate, remember and recall the structure, function, and processes much more efficiently and effectively. The lessons were made more engaging and tangible by introducing these models.

IMPACT ON STUDENTS All my classes include remedial students and students who have either 504 or IEP plans or require additional support for understanding. Since the start of the semester, by conversing with students' prior teachers and letting them explain their choice of learning, I had found that most of my students were inclined towards visual and/or kinesthetic learning. Students therefore appreciated the hands-on models, which attracted some students to visit during lunch break and review the structure of the cell and cell organelles using the model. Furthermore, during class discussions, the model was stationed at the center of the class. This allowed students to relate the class discussions with something tangible. I recall one time when a student asked, "Where would you find the thing that you are talking about on this model"—signifying the importance of the model's presence.

EFFECTIVENESS IN TEACHING The materials made available by the microgrant have allowed me to use the tactile model learning in many different aspects of the classroom experience, from hands-on lab activities to facilitating formative assessments. These models and lab activities allowed students to understand (even though just the surface) what is inside their microscopic cells and how these cells and cellular processes function. To boost my confidence, the data collected by formative and summative assessments on the effectiveness of the models' use in teaching proved that the lesson was reasonably successful.

IMPACT ON EDUCATORS

I have shared my models, other lab equipment, and success data with other biology teachers in my department and they have provided me with positive feedback on using these models in their classrooms.

WORDS OF ADVICE

Let students treat the models as their toys. I believe that students learn better when they play with their toys. I have gone to an extent where I had given a comparative anatomy (homologous structure) model to a student to take home so that he could sketch it.



Students identifying structure and function of cell using microscope slides and models.

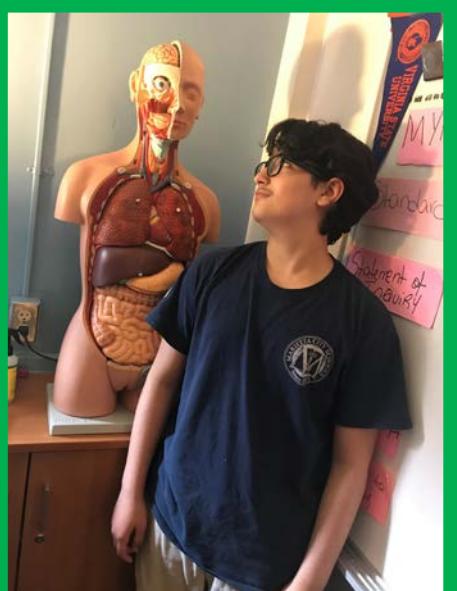
Equipment/Materials for Middle School Biology

by Marshai Waiters

2016 Cohort | Kennesaw State University | Marietta Middle School (Marietta)

SUMMARY Through the Goizueta-Woodrow Wilson Enrichment Microgrant Program, I purchased several materials and products to use within my classroom. These materials included microscopes, stereoscopes, Wi-Fi enabled cameras, Pop Beads, a human body model, genetics plant kit, and content posters. What inspired me to write my proposal was being able to provide my students with increased opportunities to interact with resources to learn. These resources may not be typical for what is in every science class, and to be able to provide students access to these materials will increase their ability to learn and connect with content. The goal of my project was exposure for my students at an earlier age to prepare them for their academic careers moving forward to high school biology and beyond.

IMPACT ON STUDENTS I have seen my students' interest and excitement increase using the materials. Students were exposed to using microscopes in the classroom and they are often intrigued with the human body model, often inquiring about the different organs on the model. This has served as enrichment for their learning experience, as not all students are not exposed at this age to these materials. I expect that the more I incorporate these materials into daily activities in science class, the more interested students will be in the course, even if their main interest lies outside of the subject. When utilizing the genetics plant kit in the coming year, I am excited to see the students using inquiry to learn and discover genetics through experimentation.



MMS student with our class Human Body.

EFFECTIVENESS IN TEACHING The funding for this project has allowed me to purchase and provide these materials and experiences to my students. I would not be able to do so without this amazing opportunity. My teaching has improved as a result because it has given me innovative ways and ideas to explore when teaching my students throughout the school year. I can think outside of the box using the materials to enhance the learning experience for each of my students. I am also able to transfer these ideas to my colleagues to use with their students.

IMPACT ON EDUCATORS I have been able to share my ideas within my Science Professional Learning Community during our weekly meetings and in preparing and planning for the curriculum for next school year. I plan to continue sharing through this manner and extending beyond my school to the other schools in our district and with my fellow teachers who are in other districts and states. Communication and connection serve to better us all as science educators and to enrich the learning experiences of our students.

WORDS OF ADVICE I would give the advice of thinking outside the box and thinking of what would help your students learn best. If it is something new, exciting, and innovative, how can you implement it into your lessons for your students? Our students depend on us to deliver content in a way that is engaging and informative for them. Do whatever it takes to provide those experiences that will impact them for a lifetime.

Multimedia STEM Learning

by Derikson Rivera, Daron Martin, Laura Lambert, and Kimberly Takagi

2016 Cohort | Piedmont College | Meadowcreek High School (Norcross) |
Monroe Area High School (Monroe) | Cedar Shoals High School (Athens)
2015 Cohort | Piedmont College | Lanier High School (Buford)

SUMMARY In our Goizueta-Woodrow Wilson Enrichment Microgrant project, we sought to investigate the implementation of PASCO probeware to augment students' data collection capabilities when performing AP Biology, chemistry, microbiology and oceanography investigations. The project also made possible novel multimedia-based pedagogical practices by funding YouTube educational screencasts, as well as the setup of an HTC VIVE Virtual Reality system and a Miracast wireless Windows 10 Tablet for instruction. These instruments exposed underrepresented minority students to innovative teaching strategies and novel instructional technology, helping to promote student interest in STEM-related curriculums, or extracurricular activities, and to nurture students' self-efficacy to perform Next Generation Science Standards' Scientific and Engineering Practices.



Using probeware, screencasting, VR, and wireless tablet to bring STEM to life.

IMPACT ON STUDENTS Using an adaptation of the STEM Semantics Surveys by Tyler-Wood et al. (2010), I found a significant change in 9th grade students who, before the project, showed no perceptions or career goals related to STEM or higher education. At the end of the first semester, a significant amount of students realized that they have an academic and career potential in STEM-related areas. Not all impacted students showed a desire to pursue a career in STEM, but the commonality among 9th-grade freshmen was that they now wished to pursue a high-skilled job with higher education on the horizon. Some STEM-related careers students wanted to pursue were embedded in areas such as biotechnology, ophthalmology, and veterinary and pediatric medicine. Other students wanted to pursue careers in forensic science, law, and business management. Moreover, a number of students showed progressive and continuous growth of engagement, interest, and participation. This trend appeared during instruction when hosting STEM-related activities with the purchased equipment and during lunch or after-school tutoring. For instance, in October 2017, approximately 52% of the students in one AP Biology course found the idea of becoming instructors of a biotechnology workshop, provided to 8th graders from Louise Radloff Middle School, appealing and exciting.

EFFECTIVENESS IN TEACHING The HTC VIVE Virtual Reality equipment and the wireless Windows 10 Tablet has provided an increase in instructor-student classroom interactions and student learning. For instance, the Virtual Reality equipment has allowed students to model chemical structures and explore simulations of metabolic processes inside the human body and cells. Specifically, the software "The Body VR: Journey Inside a Cell" and the software "Tilt Brush" by Google was used for these applications. Moreover, the Virtual Reality application "theBlu" was used in the oceanography courses to provide simulations of underwater marine ecosystems. The Windows-based tablet has provided me and my students with the capacity to draw, or write on the "board" of the class wirelessly, in an untethered way: directly from their desks or walking across the classroom. Furthermore, the laboratory equipment has supported the lessons by allowing students to record quantitative data for parameters such as pressure, temperature, and CO₂ content. The video recording equipment has supported my instruction to deliver YouTube educational screencast videos during digital learning days. Moreover, this equipment has provided me more opportunities to scaffold when performing group tasks or during after-school tutoring when students use laptops to watch previous recorded lessons, safety-nets, or explanations.

IMPACT ON EDUCATORS I have been able to disseminate the educational screencast videos on the YouTube platform (videos are available on this channel: <https://bit.ly/2HV18Um>). Moreover, I have been able to provide professional development workshops of how to use HDMI wireless video streaming adapters for tablets, laptop, and other Windows-based devices during instruction to the Meadowcreek High School Science Department. Finally, laboratory equipment has been shared across different attendance zone cluster of GCPS and Walton County Schools.

WORDS OF ADVICE The recommended specifications for a personal computer used for Educational Screencast video editing and production are a dedicated Nvidia or AMD video card with an AMD Ryzen or Intel i5 processor. Apple devices such as the new 2018 iPad base model is compatible with the Apple pencil. This device is capable of wireless video streaming to project notes, pictures, or figures during instruction with a projector by using the "Airplay" protocol. Some new Logitech webcams can remove background without the use of a greenscreen and Wacom tablets enable you to handwrite on desktop PCs without touchscreen capabilities. PASCO wireless probeware requires a host with low energy Bluetooth capability to control and monitor sensors.

Student-Centered Learning in Chemistry-Based Engineering

by Yancey Miller

2015 Cohort | Kennesaw State University | Peachtree Ridge High School (Suwanee)

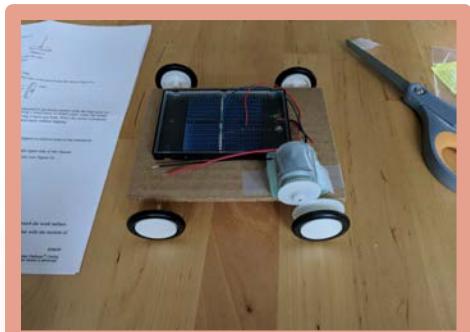
SUMMARY My Goizueta-Woodrow Wilson Enrichment Microgrant project had two main goals. First, I sought to create hands-on activities that allowed students to engage with chemistry content. Second, the integration of the foundations of engineering with chemistry content was supported through classroom materials. Chemistry can be a difficult subject for students because it describes the behavior of particles that cannot be seen with the naked eye. Through the microgrant, I sought to increase student engagement and understanding through student-centered and inquiry-based activities. The materials purchased through the microgrant funding assisted my ability to create authentic experiences for the students that helped them to form a well-rounded understanding of chemistry content. Peachtree Ridge High School has a STEM pathway, referred to as the SPIRE program, that integrates content across curricula. The freshman chemistry class that I teach is part of the SPIRE program, as it integrates chemistry with the foundations of engineering. It can be difficult to merge engineering into an introductory chemistry course. The microgrant allowed me to purchase supplies to be used by students in chemistry-based engineering challenges. This supported the successful integration of these two content areas.

IMPACT ON STUDENTS The funding and supplies purchased have had a large impact on both student engagement and higher-level thinking processes as they relate to chemistry. Sadly, many students are used to a traditional, direct-instruction learning environment. The honors students whom I teach are often very comfortable and successful in that traditional environment. However, direct instruction and drill practice, though they can be useful at times, do not support crucial skills like critical thinking and problem solving. By incorporating student-centered activities and projects, students are required to analyze the content on a higher-level. This increases rigor and supports students in their ability to truly understand the content. Throughout the school year I have seen students grow in their abilities to design experiments, support claims with evidence, and problem solve. In the beginning of the semester, it was largely difficult and uncomfortable for students to participate in a nontraditional classroom. However, as we are approaching the end of the semester, students have developed their skillsets and are much more comfortable asking questions and taking charge of their learning.

EFFECTIVENESS IN TEACHING The funding I have received for my classroom has had an incredible impact upon my teaching. It has encouraged me to push past limitations and see possibilities that I was unaware of before. If I had not received the microgrant, my students would have lost out on many of the learning experiences that they have enjoyed throughout the last several years. Incorporating classroom materials, purchased through grant funding, has encouraged both personal growth and student growth. Students have benefited from rigorous student-centered lessons and I have grown exponentially as a teacher as I have gained experience implementing a variety of student-centered lessons. Every time that I utilize equipment and materials, I feel more confident and am better able to hone the effectiveness of my educational strategies.

IMPACT ON EDUCATORS This year I have been able to bring countless new activities and ideas, made possible by the Goizueta-Woodrow Wilson Enrichment Microgrant Program, to my chemistry course team. Many teachers were unaware of the possibilities before I shared my experiences and lessons with them. The Gwinnett County Public Schools are moving towards student-centered instruction. The updated content standards require students to create experiments and analyze data to support claims. As the instructional strategies shift, I have felt comfortable sharing ideas with my colleagues in order to best support this pedagogy. This is largely in part to my experiences leading student-centered activities that have been supported by this microgrant.

WORDS OF ADVICE When implementing student-centered activities and engineering challenges, you must feel comfortable releasing the reins a little. You must give students the freedom to make their own choices in order to engage with the content. Be prepared for their ideas to take off in many different directions. Support them and guide them without simply giving them the answers. And, most importantly, have fun!



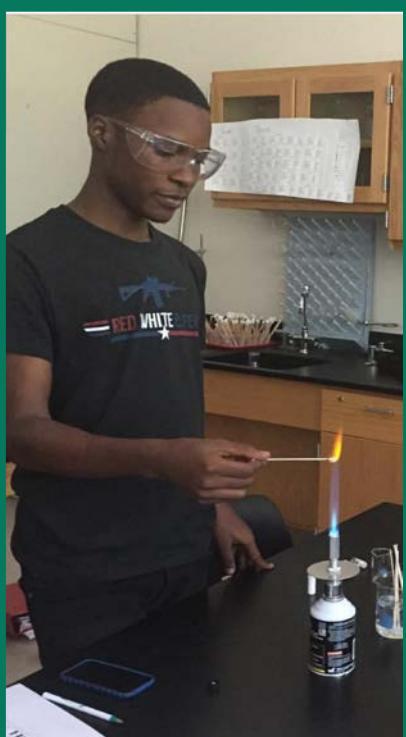
A student entry in the Solar Car Engineering Challenge.

Supplies for Hands-On Chemistry Learning

by Jessica Carter

2016 Cohort | Georgia State University | D.M. Therrell High School (Atlanta)

SUMMARY My proposal for the Goizueta–Woodrow Wilson Enrichment Microgrant was to purchase supplies for specific labs as well as general chemistry supplies so that students in my school could work with real chemicals. The department doesn't really have a budget for materials, so this microgrant allows my students to utilize real chemicals and better understand the concepts they are learning through hands-on activities. Part of the reason I feel this is important is the fact that many of my college classmates had experience with items like pH meters, chemicals, and other items common in a lab that I didn't, and I wanted to make sure that my students left my school on similar footing as their counterparts from other schools. I also wanted my pre-lab lectures to focus more on the task at hand instead of all the substitutions I had to make because of the fact that chemicals had expired or just weren't available.



Student working on the flame test lab using supplies/chemicals purchased through the microgrant.

IMPACT ON STUDENTS The students have been super excited when they hear that a lab day is coming up. They feel more ownership in their roles as a scientist and are more engaged in the lessons. Because of my students' investment in the labs, I plan to spend part of my summer planning for next year so that I can implement more labs going forward.

EFFECTIVENESS IN TEACHING The funding allowed me to do more hands-on activities for my kinetic learners and allowed real-world applications to be brought to life for my students. My demonstrations were more powerful and helped with student engagement. There is nothing that is more disappointing in a class than to have a reaction that should hook students into being excited about the lesson actually turn them off from science.

IMPACT ON EDUCATORS As I'm the only chemistry teacher, most of the materials and ideas sparked from class stay with me. However, some of the materials and labs have corresponded with the physical science teacher and we collaborated on certain labs. In addition, I worked with other educators that I met networking at NSTA to create and find informative labs for the new GSE Standards.

WORDS OF ADVICE My project so far has been mostly about making sure my students had access to the same materials and supplies as their counter parts in better equipped districts. One of the issues from this project is a place to store and hold all of the supplies purchased, and finding time to inventory the supplies once they come in. Part of my time between school years is going to be spent creating a better system than the one I inherited for storing chemicals and supplies.

Support for Independent Student Engineering Design

by Tyler Kinner

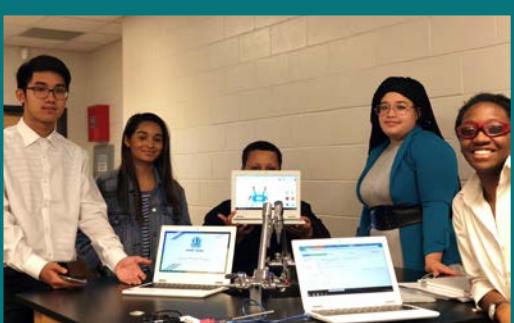
2015 Cohort | Piedmont College | Meadowcreek High School (Norcross)

SUMMARY The goal of this Goizueta–Woodrow Wilson Enrichment Microgrant project was to support afterschool STEM, primarily through a club focused on independent science or engineering projects. The actual implementation, after failed recruitment for this program, was increased implementation of research science and the engineering design process in my classroom in hopes of raising student interest and visibility of science and engineering in the content setting. The renewed goal is to create sustained interest in several students such that the afterschool program can operate in the 2018–2019 school year.

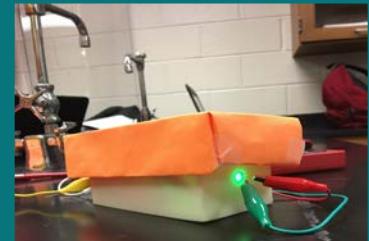
IMPACT ON STUDENTS Students are increasingly engaged not only in the content area, but in the tools we've been learning to use as part of genuine science investigation and engineering design. After learning about the acidification of water with CO₂, students who had designed water monitoring methods with drones rethought their design to allow less air into the water containment system. What more can be asked of students than to apply their content learning to a novel and authentic problem? This is the major change I have seen in my students, a realization that science teachers always hope for, reimagining science not as a monolith of established knowledge but as what it actually is—a messy endeavor of recording what works, what doesn't work, and finding out something new in the process. I plan on sharing some of the student work and ways I have engaged my students in the intersection of science and engineering at the National Convening of Woodrow Wilson Teaching Fellows in July.

EFFECTIVENESS IN TEACHING In short, the funding has increased my ability to support science investigations and engineering design in the classroom. This translates into a more student-centered, inquiry-focused, and hands-on classroom. In general, this year has confirmed that many of the dreams we have in preservice teaching do work out. Students can meaningfully create independent work in a content setting, find new knowledge, and reinforce the content.

IMPACT ON EDUCATORS Many educators in the building have remarked on the projects my students have been engaged in throughout the year. I have shared what I do in terms of progress checks and formative assessment on independent work, as well as the resources that I give the students. I am sharing some of the activities we have done to learn the engineering design process along the way at the National Convening of Woodrow Wilson Teaching Fellows.



Students presenting their work to faculty of Georgia Gwinnett College.



A student-designed and printed colorimeter.



An early prototype of a student project that was eventually created out of wood, then molded using thermal-formed plastic.

WORDS OF ADVICE My words of advice to anyone looking to convert their classroom space and time into a content-focused makerspace-of-sorts: Set clear expectations for getting out and putting away materials to save time; have an inventory system that makes sense to students and yourself to make sure everything gets put back the way it needs to go; have students reflect their own productivity, as well as their peers', on a Google form as an exit ticket (I incorporate this as a function of their grade); model the thought process behind iterative design (iterative design is hard for students, much like how they want to skip a rough draft and just write the final); remind students of the “big picture” by returning to the driving question or the problem you are trying to solve (students have a great way of finding obscure ways to spend their time).

Supplies for a New Electronics Class and Club

by Michael Fusia

2016 Cohort | Kennesaw State University | Wheeler High School (Marietta)

SUMMARY I have the opportunity of teaching electronics at Wheeler High School, a program that only a few schools in the state offer. It is amazing to me how much of everyone's daily life is dependent on, driven by, and focused on electronics, yet there is so little emphasis of teaching how electronic devices work. With the Goizueta-Woodrow Wilson Enrichment Microgrant, I was able to purchase supplies to enhance my classroom teaching as well as organize an Electronics Club to provide all students the opportunity to learn and explore electronics.

IMPACT ON STUDENTS I try to implement project-based and hands-on learning as much as I can. The microgrant has allowed me to expand the number and the scope of project opportunities I afford my students. Since electronics is an elective, not all students take the course and most are placed in the course simply because it fit into their schedule. However, between the fall and the spring semesters, I have seen an increase in interest and participation in the class. During elective registration for next year, I had a much larger group of students show interest in and sign up for the second and third electronic class that I had in the past. The club had some of its members sign up for the class in order to spend more time using the equipment and exploring different topics.

EFFECTIVENESS IN TEACHING Student engagement has gone up. The class assignments and projects from the previous semester were not well received. However, this semester, I have developed numerous stations for students to create and learn. The funding has supplied additional resources so students can expand on the basic prescribed experiments and move based on their own pace or interest. For example, at one station, students learn to connect light bulbs and switches in a mock household wiring apparatus; another station lets students build musical instruments on breadboards. If a student enjoyed the larger-scale electrical side of the class, they are able to continue working at that particular station as opposed to a student who enjoys working with smaller circuits and component-level electronics.

IMPACT ON EDUCATORS The Electronics Club has allowed me to share my love of electronics with students who either have not enrolled in or cannot enroll in the class. Though the club meets in the classroom, I am not bound by the schedule and standards of an actual class. Outside of electronics though, I will be utilizing the equipment next year in my physics class as well as my colleagues' classes, since the two share some of the same standards. I plan to share my lessons, past experience, and supplies so they and their students may benefit as well and take theory into practice.

WORDS OF ADVICE Electronics parts can be cheap, but will add up. Look at multiple sources. I could have purchased most of the components and supplies from two or three retailers, but if you spend time to shop around, you will find deals that allow you to purchase more than expected. Educational lab suppliers will have trustworthy and polished lab pieces, but they can be expensive. If you put in the research and time, you can find a better solution. I often avoid the pre-packaged labs because recipe tutorials are not always the best way to learn. Students often learn best when they confront a problem and need to find a way to fix it.



Students test a crystal (or "foxhole") radio to pick up AM radio stations.

New Tools for Electronics Testing

by Michael Fusia

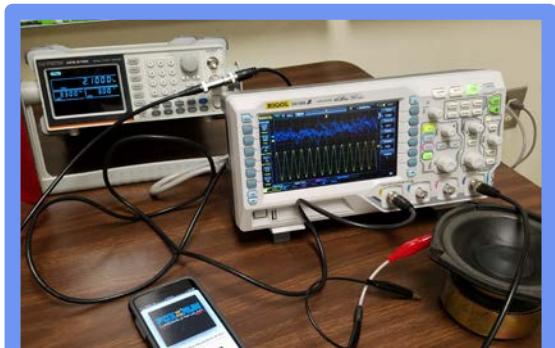
2016 Cohort | Kennesaw State University | Wheeler High School (Marietta)

SUMMARY My goal with the Goizueta-Woodrow Wilson Enrichment Microgrant is to complement my previous project and purchase quality test equipment for my electronics class. Most electronics projects don't always work the first time—which is great, because it forces students to learn through the troubleshooting process. In order to determine what went wrong, you need quality test equipment. This second project involved the purchase of oscilloscopes, function generators, multimeters, a logic analyzer, and an RF spectrum analyzer with trainer.

IMPACT ON STUDENTS The equipment purchased is either an improvement over current equipment or completely new to the classroom. The students were excited to work with the new tools. The digital oscilloscope, the most used piece of equipment, outshined the analog oscilloscopes and made additional experiments possible. For example, time-constant measurements for capacitors previously required a stop watch and quick eyes of a student; inductor time-constant experiments were impossible. With the new oscilloscopes, we were able to peer into the microsecond timeframe and not only visually see the components charge but also take more accurate measurements. The students were impressed and excited to be able to record and capture images.

EFFECTIVENESS IN TEACHING Like the students, I was excited to work with the new equipment. It provided me a way to demonstrate and visualize circuit phenomena to the class. It also started a personal learning experience: Not having a thorough background in all of the features of the equipment, I forced myself to learn more, and personally developed a better understanding of advanced circuit behavior. In turn, the equipment has helped guide my instruction, shape the curriculum, and offer insight into how concepts are connected. Additionally, I have taken a further step to becoming a facilitator to the students' learning as their projects can now be self-motivated.

IMPACT ON EDUCATORS The Electronics Club created through my previous microgrant project has benefitted from this year's project as well, as the club has had access to the new tools beyond class time. The equipment has also been used in the STEAM Symposium, a cross-curricular science fair that provides a showcase of student projects to other students in the school, community members, and feeder elementary schools. Hopefully the projects will inspire younger students to explore STEM classes. Two projects, one which utilized the spectrum analyzer and another using the oscilloscope, have inspired me to take the equipment into advanced math and physics classes to visualize and provide context to the concepts taught in those classes.



The oscilloscope can display multiple waves, provide troubleshooting insight, and give accurate measurements from a function generator or just the music on a phone!

WORDS OF ADVICE When looking for equipment to purchase, keep the framework of the classroom in mind. The microgrant allowed me to purchase fantastic equipment after comparing different models of oscilloscopes and analyzers from various retailers. In the end, I had to weigh two main issues: the limitations of the projects and the quantity of the tools to purchase. I could have bought a couple of unnecessarily high-end instruments, but scaled back and bought more pieces with reasonable specs. Any signal a student would need to test would be below 10 MHz, so there is no need to get an oscilloscope that can measure frequencies ten times that amount. After getting numerous quotes, I was lucky enough to purchase a variety of measurement tools with all the features and specifications I needed.

VR Headsets to Measure Volume in Real-World Settings

by Elizabeth Quinche Fleisher

2017 Cohort | Georgia State University | Maynard Jackson High School (Atlanta)

SUMMARY What inspired me to write the proposal for the Virtual Reality (VR) headsets was the following question: How can I make mathematics more interesting and engaging to students? I wanted to make their experience in the classroom different from their typical routine of taking notes and working on worksheets. I also wanted to create an assessment to complement the VR headsets that could measure mastery of the geometry standards—specifically, the concepts of volume—that our students are expected to know.

IMPACT ON STUDENTS The change that I have seen in my students as a result of my project was their renewed attitude towards mathematics. Many of my students are not fully engaged in a traditional math lesson, so I created a lesson where students would be exploring different places around Atlanta using the VR headsets and tying in concepts of volume. The project enriched the experience of my students by combining their environment with geometry which helped students see math not as abstract, but a subject applied in the real world. Many of my students ask me if we can use the headsets more often.

EFFECTIVENESS IN TEACHING The funding for my project has supported my ability to incorporate technology into my teaching methods. The project helped me better consider how to include my students' interests, culture, and environment into my lessons. The Goizueta–Woodrow Wilson Enrichment Microgrant Program has also given me an opportunity to reflect on my teaching practices and improve the project for my future students.



Students are using VR headsets to work on “Volume and the City” assignment.

IMPACT ON EDUCATORS

I have been able to share my ideas with other Teaching Fellows through workshops set up through the Woodrow Wilson Foundation. I plan to share my project through social networks, such as Facebook and LinkedIn. I also plan to share my work with my colleagues at my secondary school for feedback.

WORDS OF ADVICE

Keep facilitation in mind as you implement the project. I had my students in pairs to work on the assignment. I also had my students go through a tutorial on how to use the VR headsets the day before the lesson to help with facilitation the next day. Be very clear on ground rules when using the headsets (Ex: Make sure you are sitting down before putting on the headset. Make sure to share the headset with your partner.)

VR Headsets for Science Inspiration

by Robyn Chuck

2017 Cohort | Piedmont College | Meadowcreek High School (Norcross)

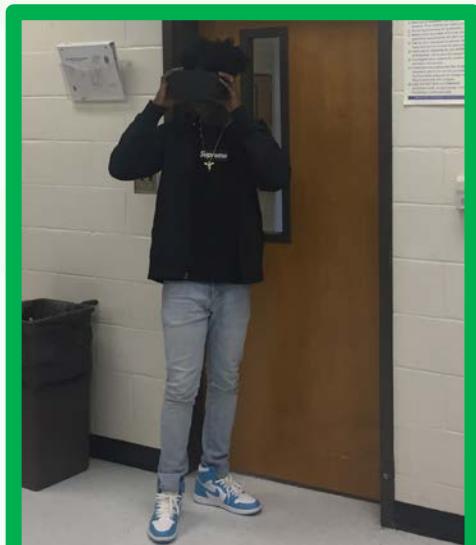
SUMMARY I used the Goizueta-Woodrow Wilson Enrichment Microgrant to purchase iPods and Virtual Reality (VR) headsets for my classroom. I was inspired to purchase the technology after watching another Woodrow Wilson Teaching Fellow from Piedmont College (Derickson Rivera) utilize the technology for our STEM summer camp for local middle school students. The campers' resulting learning experiences inspired me to purchase the technology for my own classroom. My goal was to utilize the technology to increase student engagement and comprehension of the content. I wanted to provide students with learning experiences that would have more impact and lead to greater self-efficacy.

IMPACT ON STUDENTS I expect to see a change in students' disposition towards the usage of technology in the classroom. I have seen increased student engagement when Virtual Reality technology is integrated into my instruction. The technology utilization in the classroom has provided the students opportunities to link content standards to STEM education. I plan to integrate the technology into the classroom more and begin creating my own content for students to view in the VR headsets.

EFFECTIVENESS IN TEACHING The integration of the Virtual Reality technology in my clinical placement has afforded me the opportunity to create technological experiences for my students. Through the VR headsets, they can view abstract concepts that I am unable to demonstrate in class. The technology has allowed me to use students' interest to improve their comprehension of the content. I have been able to use the technology as an incentive for work completion. Recently, I allowed students who completed their work early to use the Virtual Reality headsets to explore nuclear power plants throughout the world. I have also used the headsets to reinforce the concepts covered in class by providing a visual, spatial, and auditory simulating experiences.

IMPACT ON EDUCATORS I was given the opportunity to present at Piedmont College's Educator Renewal Conference on how I have utilized the Virtual Reality technology in my clinical placement. I discussed the advantages and disadvantages of technology and how teachers can integrate the technology into their classrooms using students' cellphones and self-made VR headsets. In addition, I have shared my knowledge of VR technology with Teaching Fellows in Piedmont College's third cohort.

WORDS OF ADVICE I would consider the average class size and planned usage. I would recommend looking into higher quality Virtual Reality equipment and possibly purchasing a smaller quantity. More advanced VR technology would provide students with a more immersive experience. In addition, the new generation of iPods are considerably smaller than previous generations which affect the Virtual Reality experience. If you would like to continue the device and VR headset method, I would recommend considering using cell phones instead as the screens will be larger than the iPods.



Student virtually touring a nuclear power plant.

Calculators and Math Manipulatives for Algebra

by Diane Overton

2017 Cohort | Kennesaw State University | Campbell High School (Smyrna)

SUMMARY I applied for a Goizueta–Woodrow Wilson Enrichment Microgrant for a class set of scientific calculators, a collection of large dry erase boards, a class set of algebra tiles, and many other math manipulatives and materials. My goal is to use these resources in my current and future classrooms to promote critical thinking and engage students in active learning. I was inspired to write this proposal because I want to provide my students with as many opportunities as possible to actively engage with the math concepts we are studying in our algebra class.

IMPACT ON STUDENTS As a result of having these resources available in the classroom, my students increased their procedural knowledge and their active engagement with the math content. Some positive student outcomes that I observed were: an increase in students' ability to complete computations using calculators, freedom to move around the classroom and complete work using dry erase boards, and understanding concepts more fully by exploring multiple representations and visuals such as algebra tiles and graphs.

EFFECTIVENESS IN TEACHING Having these resources available in my classroom has widened the possibilities for learning activities that I can use with my students. Utilizing the tools purchased with the microgrant, I increased the number of times I incorporated critical thinking opportunities into our daily work in the classroom. I was also able to incorporate interactive classroom activities using the math manipulatives and other resources.



A few of the manipulatives and other materials purchased for use in my math classroom.

IMPACT ON EDUCATORS I plan to communicate with other teachers about how they can utilize similar resources in their classrooms to achieve the best results for students. I can share what I have learned about teaching students the proper and respectful use of materials, as well as how to incorporate the use of a variety of materials into daily lesson plans.

WORDS OF ADVICE I would advise other educators looking to utilize similar resources in the classroom to implement new materials one at a time. Attempting to implement many new tools in the classroom in a short period makes it difficult to use each of the tools to its fullest extent. Also, there are some larger tools such as magnetic algebra tiles and magnetic x-y grids that would be very costly to purchase as a class set; the use of these tools should be planned carefully so that they benefit the maximum number of students.

Calculators and Student Confidence in Physics

by Cassy Smith

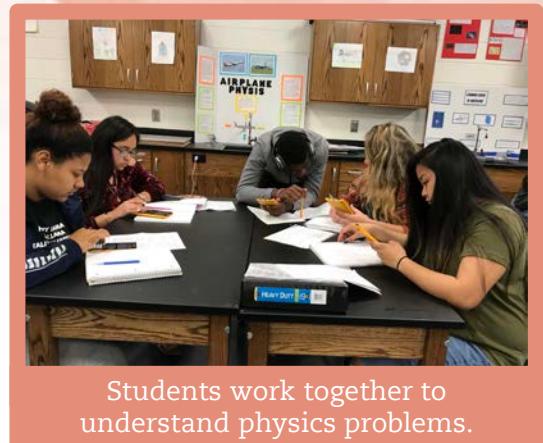
2015 Cohort | Kennesaw State University | Eagle's Landing High School (McDonough)

SUMMARY On our first test day of the year, as I watched about two-thirds of my physics classes scramble to find calculators from different teachers in the building it became apparent to me how many of my students do not have calculators, a critical classroom supply. Without calculators, my students cannot solve physics problems. I therefore purchased a classroom set of 30 TI Nspire calculators, tools that allow my students to feel confident and be successful.

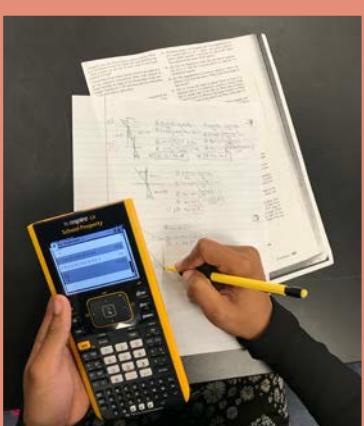
IMPACT ON STUDENTS Several of my students were very discouraged before we obtained the calculators. That vibe of discouragement and overall frustration vanished after we got the calculators. Now, my students rarely make silly mistakes on their calculators. If they do, these mistakes are easy for me to show them and for them to learn from. The students are way more confident in their abilities. Also, my students no longer have to worry on test day that they will be without a calculator.

EFFECTIVENESS IN TEACHING In the beginning, I lost a lot of time that I could have been using to teach physics for diagnosing issues with students using scientific calculators incorrectly. I also fought the battle of keeping my kids encouraged when they kept getting the wrong answers (due to their calculators). Now that we have calculators, I have more time to focus on physics and to build my students' confidence as learners in the subject.

IMPACT ON EDUCATORS My students (past and current) frequently ask to borrow the calculators. The calculators have been used in the biology and chemistry classes at my school. Students have also been able to use them for state-based exams.



Students work together to understand physics problems.



Student using calculator to solve physics problems.



Students using a graphing calculator to solve problems on Snell's law.

WORDS OF ADVICE

Having calculators for my class has changed the dynamic of my classroom. My students know that the Goizueta-Woodrow Wilson Enrichment Microgrant Program, the school, and I believe in them and believe they deserve these calculators to help them succeed in physics. My students know they have a champion on their side. And, now that they are getting the right answers, they are starting to believe in themselves, too.

Whiteboard Walls for Math Engagement

by Jessica Wise

2017 Cohort | Kennesaw State University | Sprayberry High School (Marietta)

SUMMARY During my clinical placement, I observed that many students tried to solve a problem as quickly as possible, with little enthusiasm for structured practice of mathematical skills. My Goizueta-Woodrow Wilson Enrichment Microgrant project was to use whiteboard wall paint to create additional exploration and thinking spaces for students in algebra classes. After painting the walls of the classroom with whiteboard paint, we used colored notecards to write down differentiated practice problems for mathematical skills, building a collection of colored and tiered practice problems. The goal was to offer increased exploration space as a means of improving students' willingness to practice and explore math and also increase achievement.

IMPACT ON STUDENTS I have seen that whiteboard walls increase students' willingness to practice, their persistence in solving problems, their confidence, and their ability to analyze and fix errors, as well as their level of collaboration and discourse. In the future, I will use the remainder of my microgrant to continue my research by creating whiteboard walls in my classroom. I plan to focus my next stage of research on determining if whiteboard walls increase engagement and success in solving non-algorithmic mathematics problems. Of my students, 64% felt that they made fewer mistakes working on the whiteboard wall, 38% felt that the wall improved their ability to see errors, and 26% of students believed the wall made it easier to fix mistakes. More than 50% felt that the wall provided better space for working and exploring problems, 23% liked being able to stand and do mathematics work, and 25% felt working on the wall was "fun."



Students using the whiteboard wall to combine functions.



Working with students who are practicing with individual whiteboards.

EFFECTIVENESS IN TEACHING The microgrant has improved my teaching by being instrumental in increasing collaboration, discourse, and achievement in my class. Classroom management and engagement has been improved by having a practice tool that gets students out of their desks and talking with their peers about mathematics. The Goizueta-Woodrow Wilson Enrichment Microgrant program—through the workshops—has also given me information about increasing funding, being a school leader, and completing research.

IMPACT ON EDUCATORS The mathematics department and the Algebra PLCs have been invited to test the wall, and my cooperating teacher and I have discussed its usefulness in the classroom. Leaders in the district of my clinical placement were eager to know more about the whiteboard wall. They visited the class and spoke with my CT about the brand, costs, and its usability. In the future, my CT and I plan to continue researching and eventually publish or present on its use in classrooms.

WORDS OF ADVICE There are many brands of whiteboard paint such as Rust-Oleum Dry Erase, ReMARKable, and IdeaPaint. ReMARKable has low odor and is the same cost as idea paint; however, ReMARKable often has a 20% off special on the first order and free shipping. When applying the ReMARKable paint, be sure to apply a thick, single coat. Make one batch at a time as it cures in a short amount of time. The paint costs \$630 for 200 square-feet of paint.



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