

The Goizueta-Woodrow Wilson Enrichment Microgrant Program Symposium

Presentation Packet | May 13, 2017

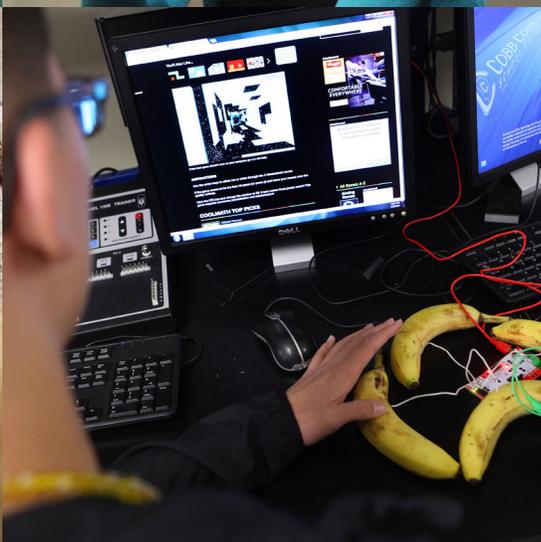
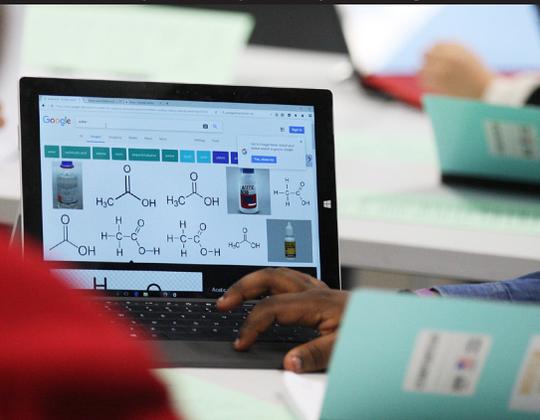


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Goizueta-Woodrow Wilson Enrichment Microgrant Program

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 the achievement gap nationwide.

List of Projects by Fellow

<i>Fellow (Partner Institution)</i>	<i>Pages</i>
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For questions or more information about the Goizueta-WW Enrichment Microgrant Program, please contact wwgatfmicrogrants@woodrow.org.

Gabrielle Arondel Shamika Crawford Tiffany Witter

2016 Cohort | Georgia State University

Stone Mountain High School | Stone Mountain, GA

SUMMARY

We decided to attend the 2017 National Science Teacher Association (NSTA) Conference with the Goizueta-Woodrow Wilson Enrichment Microgrant. This conference is held annually in various states around the country and this year was held in Los Angeles, CA. As new science educators, we were inspired to write the proposal because we understood the value in learning the instructional methods and strategies science teachers were implementing in their classrooms to make science concepts more relevant and engaging to students. Our goal was not only to learn how teachers are making a difference in their own classrooms and communities, but also to bring that knowledge back to our own classrooms to powerfully impact our students.

IMPACT ON STUDENTS

We plan to use the knowledge taken away from the conference (i.e. using interactive notebooks, POGIL [process-oriented guided inquiry learning], nature of science concepts, globalization in the classroom, academic language) and implement it inside our classrooms. This will have tremendous impact on our students as we were able to learn how to implement new pedagogical approaches effectively and efficiently. From the workshops, seminars, and exhibits, all were beneficial in demonstrating how STEM can be utilized to positively affect student learning.

EFFECTIVENESS IN TEACHING

Our attendance at NSTA has supported our teaching through professional development and exposure to numerous new instructional methods that are useful in educating science students. We have become more aware of how science can be taught to impact communities and be more relevant to the students we teach. While the effects of NSTA on our teaching will become more evident in our first year of teaching, the NSTA experience has made us become more reflective on how we teach science.

IMPACT ON EDUCATORS

Extensive notes were taken during the sessions we attended, and were shared among our peers in the teacher preparation program at Georgia State University, along with the science faculty at our placement school.

WORDS OF ADVICE

Be flexible! National conferences can be overwhelming due to the number of sessions, workshops, and exhibits that are available. Plan out the sessions you would like to attend a day prior and have a few backups in case some are cancelled or are filled to capacity. Also, don't feel obligated to stay in a session that is not helpful to your teaching. Time is limited and you are there to learn and improve your practice.



Goizueta-Woodrow Wilson Enrichment Microgrant

Jessica Carter Sara E. Turmel Mary Wagner

2016 Cohort | Georgia State University

Daniel McLaughlin Therrell High School | Atlanta, GA

Cedar Grove High School | Ellenwood, GA

SUMMARY

Mary Wagner, Sara Turmel, and I attended the NSTA conference in Los Angeles, California with our Goizueta-Woodrow Wilson Enrichment Microgrant. As pre-service teachers and as teachers of diverse students, we decided some of the sessions, especially the *Mission Possible: Equity for Universal Access* track, could help us develop strategies to take into our own classrooms next year when we don't have the support of a mentor teacher in the room with us. We wanted to find ways to support our diverse student populations with scientific understanding and ways to grow as new teachers.

IMPACT ON STUDENTS

I came away from NSTA with ideas to help my students increase their identities as scientists, even if just for the time within the classroom, through some of the nature of the science sessions. I also wanted to impact my students in all of their classrooms, as a lot of the sessions I attended at NSTA concerned helping students, from gifted to special needs, learn how to organize and prepare lab notebooks. I hope that by scaffolding organization in my classes next year I can help them grow as students across many classrooms.

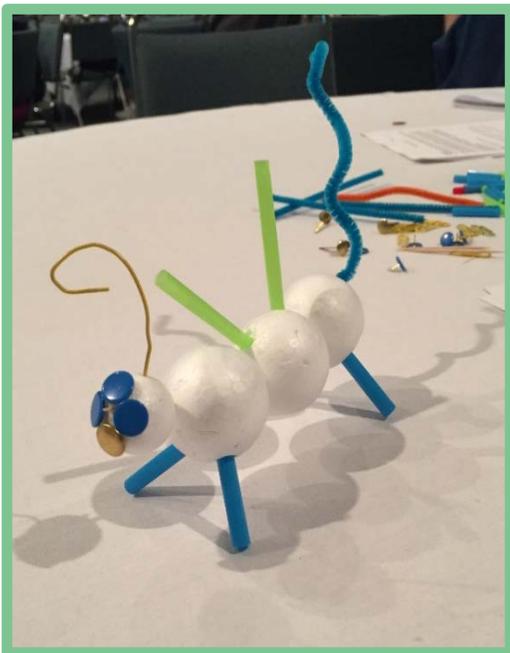


Photo of a genetics based activity Mary Wagner worked on during a session on bringing NGSS-based assessments to STEM

EFFECTIVENESS IN TEACHING

My trip to the NSTA conference was an extremely valuable experience that impacted my work in classroom both immediately and as I plan for my classes next year. In particular, I found that the sessions focused on implementation of the Next Generation Science Standards provided many ideas on how to structure lessons utilizing phenomena as a guide. Moving toward this type of lesson will be engaging for all students. – Mary Wagner

The conference has already had an impact on my teaching! One session I went to suggested an engineering design project for momentum. I was able to use this idea for a lesson with my class. They loved it and learned a lot! – Sara Turmel

The trip overall helped influence the kind of teacher I want to be. While I was there I attended sessions across multiple contents and subjects. This will help me as I prepare to be a science teacher. I also spent a large amount of my time in sessions geared toward teaching students with special needs, whether they were gifted students, special education students, or English language learners. I believe I came away from NSTA with a better understanding of how to adjust for my students in ways that are meaningful to them. – Jessica Carter

IMPACT ON EDUCATORS

After some of our sessions we recorded videos that gave a synopsis of the session and what we took from it so that we could share with others. We also took back some of our ideas and shared with our mentor teachers.

WORDS OF ADVICE

Take more notes, take more pictures, audio record sessions if they will allow. While I took plenty of notes, by the end of the conference the memories blur together.

James M. Herndon Cassy Smith

2015 Cohort | Kennesaw State University

Cherokee High School | Canton, GA

Eagles Landing High School | McDonough, GA

SUMMARY The Goizueta-WW Enrichment Microgrant funded a trip for myself, my department head, and another 2016 Fellow to the 2017 National Science Teachers Association's annual meeting in Los Angeles, California. I chose to spend the majority of my time in the exhibit hall, talking with other teachers, accumulating as many ideas and as much information as possible, and looking at new equipment. In particular, I have been very interested in implementing more astronomy-based physics in lessons to help students grasp difficult concepts. The NSTA conference offered an abundance of astronomy resources, including a plethora of interactive websites that test student understanding and give immediate feedback. I have been researching each company further to determine how I could utilize their products or services. Attending NSTA was an incredible experience that I highly recommend to all science teachers to help create a 21st century classroom.

IMPACT ON STUDENTS Through several products and resources found during this NSTA trip, I have already started planning for next year. The conference inspired me to bring into my classroom a program called *SpaceEngine*, which allows the user to explore the solar system, galaxy and beyond, all while giving valuable information related to some of the concepts we have been discussing. It was incredible to see how engaged students became, and I plan to continue to find ways to use this program in my instruction. In fact, the program is compatible with virtual reality, which has given me ideas about seeking support for a gaming computer and virtual reality headset, which can also be used for several VR physics simulators and games I have recently discovered.

EFFECTIVENESS IN TEACHING My ability to plan instruction has drastically improved as a result of attending this conference. I now feel more comfortable maximizing student-centered activities and am confident that students will be able to discover physical concepts through inquiry based activities, as laid out in the new Georgia Standards of Excellence. For our current unit on circuits, I had lab-based instruction from the very first day. Students measured voltages and currents and graphed the results in an attempt to lead to an independent discovery of Ohm's Law. It has been a great experience, allowing students to discover the principles by which current flows in different types of circuits and has led to more engagement and an enhanced understanding of the topic that I do not believe I would have seen otherwise.



Hydrogen Horizon Automotive Challenge

IMPACT ON EDUCATORS I have shared resources and ideas with my mentor and have shared my experience with my department at our last meeting. Many of the resources I found are more suited toward life science, so I was able to bring back suggestions for my colleagues in other fields as well. Many of my fellow science teachers were intrigued and expressed interest in attending an NSTA conference in the future.

WORDS OF ADVICE The most important words of advice I would be to attend this conference at least once in your teaching career. I learned more than I could have imagined and discovered resources that I know will improve my students' learning experience. In terms of planning, be sure to reserve hotel rooms early as the hotels within a mile tend to fill up quickly. Start looking ahead to talks and workshops as soon as they are available online and try to make a schedule of what you would like to go. Do not neglect the exhibit hall and make sure to take as many brochures and business cards as you can to utilize for later, given that the amount of resources can be a little overwhelming initially. Lastly, try to network with as many people as possible and have fun!

Tareha Hopkins Wanda Harding Gino Elia

2016 Cohort | Piedmont College
Meadowcreek High School | Norcross, GA
Cedar Shoals High School | Athens, GA
Habersham High School | Clarkesville, GA

SUMMARY

I was interested in attending the NCTM 2016-2017 Annual Meeting and Expo because it's a great opportunity to learn from industry leaders who are implementing the latest research-based strategies and using the latest educational resources. It would complement the theories on progressive education that I've been learning during my master's program. I wanted to see how master educators are putting these theories in action in their classrooms. I was also interested in seeing what's new in mathematics education as far as keeping students engaged and addressing their individual needs. As new teachers, this was a great opportunity for us to learn strategies that will help us better meet our students' needs.

IMPACT ON STUDENTS

I will continue to assess the effectiveness of the knowledge that I gained from the NCTM 2016-2017 Annual Meeting and Expo by reflecting on my ability to meet the needs of the learners in my class. I will formally reflect in writing on how the Expo has helped me become a better educator and whether the information I received was redundant or new and useful. I'll also consider my students' responses to changes in my teaching style and ability. As a yearlong member of the NCTM, I will continue to use the online resources to learn new instructional strategies and advancement in education theory.

EFFECTIVENESS IN TEACHING

There are over 700 sessions and workshops to choose from, which is a huge wealth of knowledge. I was super-excited to attend this Expo because it's all about math. Over these past months, I've learned lots about teaching strategies; however, the focus is not usually on math, but on another subject stretched to fit math. Math is a unique subject to teach. It needs its own special strategies sometimes. It's prone to abstraction and lots of people have a negative disposition towards it or even a phobia of it. The more we as math educators learn about teaching the subject, the better our students, schools and our profession will become.



IMPACT ON EDUCATORS

The opportunity for networking with other math teachers who are actively seeking to better their practice is one of the great benefits for attending the conference. I also enjoy the inspirational speeches and stories from fellow educators and keynote speakers. My host teacher and I are planning to conduct training on educational resources and strategies that we found helpful. There is opportunity for introducing new resources and strategies during our Algebra II team meetings, math department meeting and our STEM

department meetings. I will also continue to share, as all of the STEM facilitators do, during STEM department's bimonthly meetings. Meadowcreek's STEM department is focused on alignment across all schools within its cluster, and therefore Meadowcreek closely collaborates with the schools within its cluster as well as with neighboring clusters and districts. There are many opportunities to share knowledge and resources across Meadowcreek's close-knit network.

WORDS OF ADVICE

As we continue to grow our practice as educators, we should not forget that we are lifelong learners. For those of us who are hands-on/tactile learners, taking time out from our busy schedules to see how professional educators implement theory-based teaching can be very helpful. I especially enjoy the opportunity to question presenters face-to-face about the details of their strategies/practices. That type of insight cannot be gained from studying a book.

Afinju O. McDowell

Linda Harris

2016 Cohort | Georgia State University

Daniel McLaughlin Therrell High School | Atlanta, GA

SUMMARY

I used my Goizueta-Woodrow Wilson Enrichment Microgrant to attend the National Council of Teachers of Mathematics (NCTM) Innov8 Conference with another Woodrow Wilson Fellow at the high school and our mentor teachers. The theme of the conference was Engaging the Learner Who Struggles. I was inspired by my students to write this proposal. In the few weeks I had in my student teaching, I found many students who appeared so uninterested in math, whether because they do not understand its value or they are unable to do the work. The goal of my project is to use information and techniques learned during the conference to better plan their instruction, and to support and motivate their struggle.

IMPACT ON STUDENTS

Though I may not yet see changes in student dispositions toward STEM, I believe that the mathematical thinking process and the procedures that come from it will, over the long term, have built up their confidence that they might not be so intimidated by mathematics, and they might be willing to give the subjects a try. Many times, my students will say they do not or cannot know this material, and my response to them is always “yet.” The NCTM president gave a vignette about a teacher he knew who did this, and it made the students open to the possibility of learning. This simple action has helped to encourage a number of students who I have worked with this year.

EFFECTIVENESS IN TEACHING

The conference has supported my teaching by exposing me to the wider world of mathematics education and allowed me to interact with others in the field. It helps me to know that I am not alone in the challenges I face in my classroom. My teaching has improved from attending the conference; I do not allow myself to give up on my students. I used to simply give them answers when they were faced with a problem they believed they could not solve. I have now become comfortable with the uncomfortable silence that stretches between the student and me when they believe they cannot answer the problem. I better understand the value of letting them struggle with the problem, because once they earn it, the knowledge is theirs as long as they remember to value it.

IMPACT ON EDUCATORS

I have shared by inviting two additional teachers to attend the conference with my mentor teacher and I. I share, and intend to continue sharing, what I have learned during my school’s math content meetings. I will also bring these tools to whatever school I start teaching at this fall.

WORDS OF ADVICE

In planning conference time, I would say to be attentive to the actual needs in classrooms and to think about what workshops you will decide to attend. I would also recommend a recording suite, like an iPad or videocamera, and be sure to have a tripod with whatever device you choose. You should complete a video postcard, after the day’s workshops, to capture the freshest impressions of the events of the day. Enjoy the benefits of the conference location, and embrace being a math teacher at a professional conference.



The welcome marquee for the inaugural Innov8 Conference, held November 16–18, 2016 in St. Louis, Missouri.

Genetta Reeves Kendall Brown

2016 Cohort | Georgia State University

Cedar Grove High School | Ellenwood, GA

SUMMARY

We attended the annual conference of National Council of Teachers of Mathematics in San Antonio on April 5-8. We desired to spend time each day attending sessions that would assist us in becoming better teachers of our content as well as sessions that would benefit us as we begin our first year of teaching. We believed that NCTM offered us this opportunity. The purpose of this was to provide encouragement, offer professional development, and help us connect with a community of educators from across the globe.

IMPACT ON STUDENTS

We hope to increase student engagement and interest in STEM through the activities that we implement in the classroom. Hands-on activities, such as collecting data on a bouncy ball or using similar triangles to estimate distance, display a clear connection between mathematics and the real world. The students are given opportunities to explore certain situations and justify their findings by mathematics, which emphasizes how important mathematics is in everyday life.



Our excitement after the first day of sessions at NCTM.

EFFECTIVENESS IN TEACHING

The conference sessions we attended demonstrated various hands-on activities that we can implement in the classroom. These activities allow both of us to create a classroom that is student-centered. Through this experience, we gained a community of mathematics teachers who continually offer support and ideas to the classroom. Some of the standards that seem hard to address in the classroom were broken down and explained in an intriguing manner. In the end, we gained a new excitement for the next year.

IMPACT ON EDUCATORS

We both have been able to share with our mentor teachers the activities we learned as well as implement them into the classroom. In the near future, a department meeting will be held in which we will share some of the knowledge and activities we gained at NCTM.

WORDS OF ADVICE

If you ever have the chance to attend any conference that could further develop your teaching skills and impact your students for the better, you should attend. Although leaving the students with a substitute or using time on your break can sound like more work or exhausting, it is worth it. This experience can rejuvenate your passion to teach and prevent future burnout as an educator.

Tyler Kinner Leslie A. Dunham

2015 Cohort | Piedmont College

Meadowcreek High School | Norcross, GA

SUMMARY

The ultimate goal of this project was to leverage ongoing sustainability efforts at Meadowcreek High School. Concurrently with an additional microgrant awarded for water testing, the goal was to provide students with technology to foster collaboration and to demonstrate the potential of novel engineering solutions. The grant enabled us to purchase a classroom set of Chromebooks, which we have used to pilot Google Apps for Education at our school. Materials for water-based drones have also been purchased that will be used in coming years as this project continues to develop and grow.



Students use Chromebooks to collaborate on engineering/design challenges as well as for in classroom formative assessment.

IMPACT ON STUDENTS

Through our initial year of implementation, we have succeeded in introducing students to Google Apps for Education, as well as 21st-century digital collaboration skills and the engineering design process. Students have iteratively designed solutions to smaller problems, including monitoring acid rain and testing pH, utilizing Google Docs, Sheets, and Sites to collaborate and present their work.

EFFECTIVENESS IN TEACHING

The materials provided by the grant have allowed us to utilize digital learning in many aspects of the classroom experience, from virtual laboratories to facilitating student assessment. Greater instructional agility is afforded by this availability of technology, allowing us to have the most responsive teaching available. Students are able to utilize technology self-sufficiently when appropriate, to either access remediation material or work on independent projects.

IMPACT ON EDUCATORS

Piloting the Google Apps for Education for Meadowcreek High School has allowed us to give valuable feedback on the utility, issues, and advantages of using the apps in our classrooms. Next year the school will utilize Google Apps for Education schoolwide. In addition, the visibility of the grant has resulted in the authors providing professional development and support materials to other teachers in the local school and district.

WORDS OF ADVICE

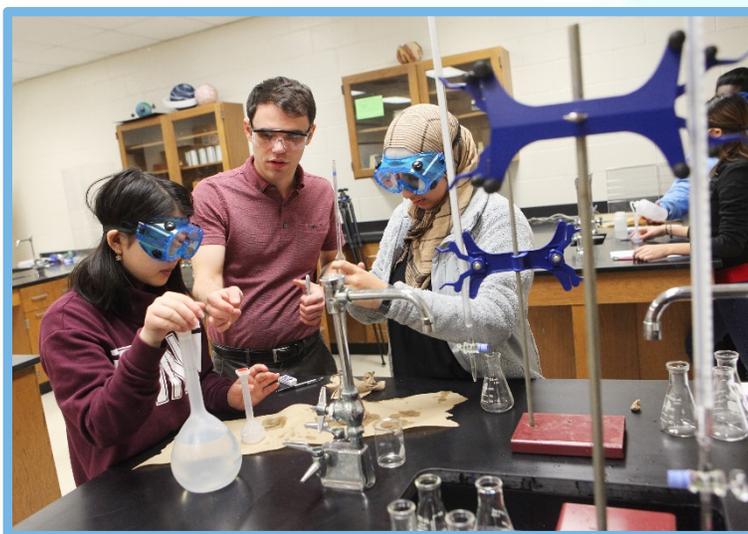
Start early! The planning process, purchasing process, and implementation process will take longer than anticipated. Make friends with your technology specialist – he or she can help you select appropriate technology for integrating with school networks, handling student use and abuse, and providing many years of continued support. Lastly, look at the big picture – each year you'll get better as a teacher, and assuming your project becomes part of your yearly instruction, it will also improve.

SUMMARY

The goal of the Goizueta-Woodrow Wilson Enrichment Microgrant was to utilize our outdoor classroom and ongoing sustainability efforts, throughout the Meadowcreek High School cluster, to provide application and context to the content material for chemistry students. By having students collect and analyze water samples from our outdoor pond, as well as water from sources inside the school, content knowledge about stoichiometry, reactions, acids and bases, and solutions would be grounded in the experience of answering the question, “What’s in our water?”

IMPACT ON STUDENTS

As we move towards 21st-century instruction and Next Generation Science Standards, students are increasingly driven to develop the skills and practices necessary for success, while also mastering content knowledge. Through the water testing experience, students are gaining valuable 21st-century skills such as digital collaboration and communication. In addition, students are practicing science and engineering principles, such as data collection, analysis, and presentation. Through all of this, students are not only mastering content and gaining experience, but also developing confidence in and association with the fields of science and engineering. For a population largely unfamiliar with careers in these fields, a positive disposition towards STEM careers is invaluable.



Students performing a titration – a key element in our water testing portfolio

EFFECTIVENESS IN TEACHING

For a first-year teacher, it’s easy, and almost tacitly understood, that we will simply exist in “survival mode.” By striving for implementation of the water-testing microgrant, I find myself having to go beyond teaching to the test. Finding time to instruct on the use and maintenance of equipment, introducing students to Google Apps for Education, and ensuring that students understand the collection and use of data requires my instruction to be efficient.

IMPACT ON EDUCATORS

Our chemistry content team has been inspired by my use of Vernier probeware provided by this grant. During post-planning, I’ll be facilitating professional development centered around using digital data collection, analysis, and presentation for the chemistry team.

WORDS OF ADVICE

Plan for students’ digital understanding, and be patient when they have never seen a computer-generated graph before. Start with the skills necessary to succeed and give them room to make errors in their pursuit of understanding!

Tareha Hopkins

2016 Cohort | Piedmont College
Meadowcreek High School | Norcross, GA

SUMMARY

I am completing my clinical studies at Meadowcreek High School, which does not provide one-to-one technology to their students. This is impossible due to their massive student population. They also do not mandate students to bring their own devices. A possible reason for this is the student body's economic demographic. Many students may not have their own devices to bring. Meadowcreek does have laptop carts that can be reserved; however, they are in high demand and short supply. This lack of technology can be really hindering at times. I applied for and received the Goizueta-Woodrow Wilson Enrichment Microgrant for 20 iPod Touches and 20 virtual reality headsets. These devices are supplemented with the technology that some students have already to bring one-to-one technology to my classroom. This technology will allow me to expand my use of various instructional strategies.

IMPACT ON STUDENTS

When introduced to the technology, students were amazed that this organization cared about their education. They were also happy that I cared enough to take the extra step of applying for this grant. This reinforced to the students that I am invested in their learning and contributes towards a healthy classroom environment. Students also look forward to the creative ways in which I relay the lessons' content. Engagement and understanding has increased and my students recognize that I spend time planning my lessons. They respect my dedication and professionalism.

EFFECTIVENESS IN TEACHING

This technology has given me access to apps which I have used to create custom experiences for my students. These apps include Cospaces, Google Sketchup/Kubity and Arasma. With Cospaces, I created a "log rules museum." Students were introduced to the rules of logarithms by completing an exploration activity that implied some rules of log. They were then asked to enter the museum and find the formal descriptions and definitions of the log rules that they previously, informally discovered. This activity was significant in helping the students understand and remember the rules of log. It forced them to read and process the museum's formal rules in order to relate them to the relationships they previously discovered on their own, to record mathematical terms as they took turns viewing and speaking the rules, and to engage and have fun. With Google Sketchup/Kubity, students are using the knowledge they've acquired in geometry to create a design for a greenhouse that our school will implement. Once they design the greenhouses, the students will use Kubity to convert their designs into VR. This activity is significant because it gives the students a more robust view of their projects; students are motivated to complete their design in order to see their creations in VR, and VR provides an interesting way to present their design to stakeholders. With Arasma, students are learning how to factor accurately and determine the most effective method of factoring various types of equations. I've created posters that explain the criteria for use of each type of factoring based on the type of quadratic equation the student is trying to solve. When the student uses the Arasma app to hover over the poster, a video of how to use that specific means of factoring plays. This allows the students to associate the criteria with the method, and it allows them to review factoring methods on their own if necessary.



IMPACT ON EDUCATORS

Other teachers ask me about how they can get similar technology for their classrooms. I show them websites where they can apply for mini-grants for classroom technology. I actually helped one teacher write a grant. Some teachers are curious about the time it takes to create my lessons and configure the 20 devices. I explain to them that taking extra time to plan lessons can free up more class time that can be used toward interesting discussion and reflection. One teacher from another school, who observed my class during a lesson in which I used the devices, thought I was teaching accelerated students because of the engagement and discussion that took place.

WORDS OF ADVICE

I advise teachers to only use technology when it enhances instruction. Do not use it just because it is a buzzword. Using technology when there is no authentic need for it can cause it to become a distraction, hindrance, or crutch for students. Students will also lose appreciation for the technology if it is abused.

Laila Bacha Kendall Schlundt

2016 Cohort | Kennesaw State University

Marietta High School | Marietta, GA

SUMMARY

We purchased 20 Chromebooks to use in our classrooms with the Goizueta-Woodrow Wilson Enrichment Microgrant. We felt that we could make our lessons more engaging by incorporating technology and we would see a positive impact with test scores and student engagement.

IMPACT ON STUDENTS

The Chromebooks have made a positive impact on our classroom environment. The students get excited about using the Chromebooks in the classroom and they are engaged in the lessons. Using Desmos.com, a math graphing website, we have created a lot of activities and investigations that are engaging and fun for the students. We have also used the Chromebooks to differentiate different lessons for our students based on the student's knowledge of the unit. Because of this, we are able to have several different lessons going on at the same time, benefiting all students.

EFFECTIVENESS IN TEACHING

With the help of the Chromebooks, we have been able to focus our attention on making our lessons more beneficial and engaging for our students. It takes us less time to create activities that are more helpful to each individual student. Using the Chromebooks allows us to spend more time assisting students and differentiating lessons. They have also enabled us to improve our teaching, as the students are more engaged and their test scores are improved.

IMPACT ON EDUCATORS

When the Chromebooks are not being used in our classroom, we allow other teachers to use them and benefit from them. All the math teachers that have used them think they are such a great assist to our classroom and teaching.

WORDS OF ADVICE

We would tell any teacher or school to purchase Chromebooks for their classrooms and learn how to implement them properly to benefit the students. We would also suggest taking courses to learn different ways to create engaging activities.



SUMMARY

I wrote a grant for a class set of Chromebooks. At my school, there are computer carts and computer labs that teachers can sign up for. However, I was told from the very beginning of the school year that these resources were often booked months in advance. Therefore, I decided to write the grant for a class set of Chromebooks. I recognize that the incorporation of technology within the classroom is very important to my students' learning process.

IMPACT ON STUDENTS

I have a very student-centered class where I expect students to advocate for their own learning. I limit the amount of direct instruction that I provide the class, and students work in collaborative groups through various exercises. The Chromebooks have had a significant impact on my students; they use the computers to look up information, put together presentations, and perform simulations and web-based activities to assist their learning. I believe that the ability to take control of their learning has created a positive impact on student disposition to STEM.

EFFECTIVENESS IN TEACHING

Having technology in the classroom has had a significant impact on my teaching. It has opened doors for learning activities and assessment techniques that would otherwise not be available. My students frequently use the Chromebooks for web-based simulations, research, documentation and assessment. Students can log into quiz.iiz or Kahoot! to assess their learning, and this feedback allows me to better plan engaging lessons.

IMPACT ON EDUCATORS

I have shared my experiences with my peers and colleagues at my school. I had numerous conversations about how I decided on the model of Chromebooks, what I was looking for in a Chromebook cart and how I utilized the Chromebooks within my classroom. After discussing this with my department chair, she decided that she would seek funding for all of the teachers within the science department to have a class set of Chromebooks. I also provided her with detailed information about the laptop cart I purchased and pricing of carts. For example, I was able to save some money by purchasing a tablet cart instead of a laptop cart. The Chromebooks that I ordered can appropriately fit within tablet cart spacing.



WORDS OF ADVICE

Technology is vital to the modern student. I would suggest looking for a computer that was designed for education because they tend to be more durable. Also, I would consider the sizing of the computer so that you could consider a tablet cart in lieu of a computer cart, which tend to be more expensive. Lastly, University of Colorado, at Boulder, offers free online simulations; the simulations that are html5 compatible are able to run on Chromebooks. They are converting more and more of their sims to html5 too!

SUMMARY

Technology plays a pivotal role in today's classroom. To move toward a one-to-one student to technology ratio, I purchased a classroom set of Google Chromebooks. The goal of the project was to provide increased opportunity for the implementation of technology-enhanced instruction and to promote a subsequent elevation in student engagement and conceptual understanding of mathematical concepts. These portable devices opened the door for a range of opportunities for interactive modeling, scaffolding online instruction, programming, and real-world applications.

IMPACT ON STUDENTS

With the use of Chromebooks in the classroom, I have seen more student engagement and conceptual understanding. I hope to see more breadth of understanding and application of geometry concepts, encourage more critical thinking through student exploration, and evoke a heightened interest in STEM.

EFFECTIVENESS IN TEACHING

The funding afforded me the opportunity to implement more technology-enhanced instruction in my classroom. Without the hindrance of sharing a single laptop cart among several teachers, I have had the flexibility to maximize the time spent using Chromebooks in the classroom. I have used online resources such as Desmos, Gizmos, Nearpod, and Geogebra to present course content to students in a manner that is interactive and engaging. Using technology, we created mathematical models and examples of mathematics in art, music, and other real-world applications.

IMPACT ON EDUCATORS

As I plan, design, and implement technology-enhanced lessons and activities, I plan to share information with teachers in my school, my district, and the broader educational community via collaborative meetings and social media. I will maintain a website with links and documents for quick reference. By sharing successes, challenges, and best practices for Chromebook use in the classroom, I hope to leave a lasting impact on both teaching and learning.



Chromebooks in the classroom, modeling with geometry

WORDS OF ADVICE

Don't be afraid to give it a try! If you don't know how to use a program or resource, now is a great time for you and your students to learn together. Today's generation has grown up with technology, so we as educators should build upon that foundation.

Michael Sanderson

2016 Cohort | Kennesaw State University

Marietta High School | Marietta, GA

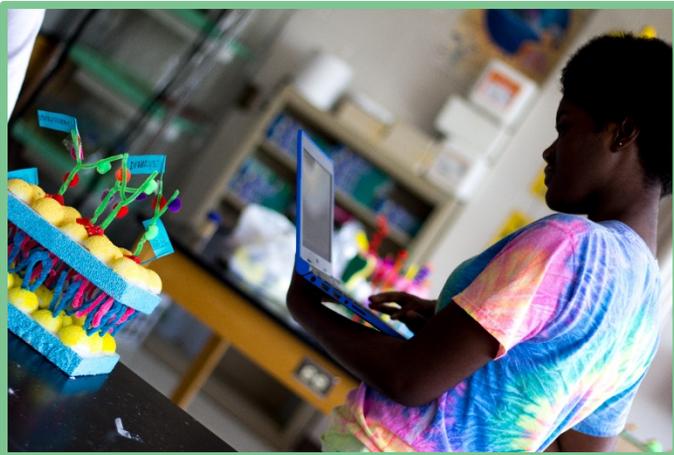
SUMMARY

Access to technology promotes engagement and maintains interest for high school students in STEM classrooms (Wolf, 2008). In recent years, Google's Chromebooks have demonstrated to be an effective tool for technology integration (Leary et al., 2016). More specifically, they are the technology of choice for three reasons: (i) they are significantly cheaper than iPads, (ii) keyboards are an important feature and are not provided with iPads, and (iii) Chromebooks provide easy access to desired collaborative and creative applications (Schaffhauser, 2015). The overarching goal of this grant was to provide a more collaborative and student-centered learning environment through the use of Chromebooks.

IMPACT ON STUDENTS

The frequent use of Chromebooks has shaped students' perception of science. Access to technology has created a more collaborative and positive learning environment. In addition, Chromebooks have given the students a means for independent research. This independence creates a classroom where everyone can be a teacher. To have a better understanding of the impact Chromebooks have on students' perception of science, an anonymous survey was conducted. Students were asked to describe how Chromebooks impact their feelings towards biology. Out of the 79 students surveyed, 65% of students had a positive view of biology because of the Chromebooks, 27% claimed no impact, and 8% had a negative few. The following is a sample of students' thoughts:

- "It (Chromebooks) makes me like science more because I can look stuff up if I don't understand and I like science when I get it."
- "I love science, and having Chromebooks available offers a resource to use for answers to burning questions."



EFFECTIVENESS IN TEACHING

With Chromebooks, I was able to develop a learning environment that effectively teaches the nature of science alongside content standards. This provides a more authentic experience for students who are interested in entering STEM fields. Furthermore, Chromebooks aid in differentiation of instruction for individual students. Technology in the classroom provides access to a variety of materials and tools that can help students master challenging content.

IMPACT ON EDUCATORS

Technology employed in my classroom will be disseminated to the Marietta High School science department at the department meetings as well as the weekly PLC meetings.

WORDS OF ADVICE

Implementing a technology-driven curriculum requires a student-centered classroom. Addressing technology etiquette is as important as teaching technology effectiveness.

Michael Fusia Nata Wayne

2016 Cohort | Kennesaw State University

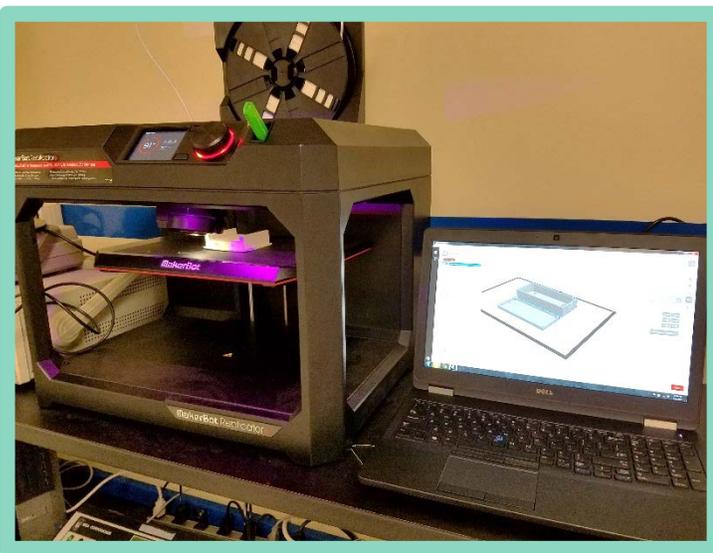
Joseph Wheeler High School | Marietta, GA

SUMMARY

Project-based classrooms need resources, and a 3D printer can often provide the unique pieces required in project-based science education. Students use class time exploring concepts through projects of their own design that may require a specific part or piece. If a student wants to print an apple to demonstrate gravity, they can. Aside from student projects, the 3D printer is also an excellent source for creating models and manipulatives for instruction. In either case, students have the opportunity to explore an emerging technology, learn how to prototype, and create a unique way to explore units, weight, chemical bonding, and other concepts. Our goal is to have every student create something either for a presentation or for constructing a project.

IMPACT ON STUDENTS

The printer has increased student participation in class projects. They are excited to see the thing they design or modify come to life. Because some students are very familiar with CAD software through other classes, they help out other students and teach each other (and sometimes us). The collaboration and problem solving is a great side effect of having the printer in the classroom. Outside of our classrooms and away from the content, we have worked with different clubs like the F1 racing team and robotics team to print parts for their projects. If a print is in progress during class, we get to explain what it is and introduce different communities in the school to students. With the student mind in consideration, we have created fidgets and mind games using the printer. The manipulatives that allow the student either to focus or stimulate their mind may not be directly linked to the content, but can still keep the student enriched.



EFFECTIVENESS IN TEACHING

Through use of the printer, we are able to become more facilitators of learning instead of lecturers. We get to work with students and groups to differentiate the content to specific applications and projects.

IMPACT ON EDUCATORS

Many of our students have used the printer for projects in their other classes. Other teachers have used the printer for manipulatives and models in their classes as well. We are always happy to print something if it'll help a student learn.

WORDS OF ADVICE

Be mindful of the computers available. Basic projects may be developed on basic school computers, but more complex designs might require a more powerful computer and software. You also have to walk the line between printing something simple to get the students initially engaged and printing something relevant and useful.

SUMMARY

My objective was to order a 3D printer in order to enhance science education for my students by increasing access to hands-on activities, increasing ownership over education, and allowing for real-world experiences. I also purchased a subscription to a site that provides 3D printed labs. With the ability to print the parts needed for a lab, the students will have more access to hands-on labs. Lab kits can be very expensive, but 3D-printing parts for a lab is not. This will increase students' ownership over their education, because they invested in making the hands-on activities possible by assisting in the 3D printing process. In my physics class I have had students ask for more teacher-centered instruction, instead of student-centered instruction. My students desire to excel but they have not been given many opportunities to be active participants in their own education. This participation will create a classroom environment in which I am not the giver of right answers but rather a facilitator in investing the world of physics.

IMPACT ON STUDENTS

The main project we did with the 3D printer was a roller coaster design project. In this project, students designed a roller coaster on paper, calculated theoretical values for the energy throughout the roller coaster, designed the roller coaster in 3D using modeling software, 3D printed the roller coaster, and measured the experimental values for energy throughout the roller coaster. At the beginning of the project, my students were frustrated. The design process took a week, and there was a lot of trial and error. This is very different from the situations students are usually presented with in school, where there is an easily obtained right answer. By the end of the project, though, the students were excited to see their roller coasters and they were really proud of them. One student started using the modeling software at home for fun. For the most part, my students had never experienced a true design process. It was an adjustment at first, but I do think it has opened their minds to engineering.

EFFECTIVENESS IN TEACHING

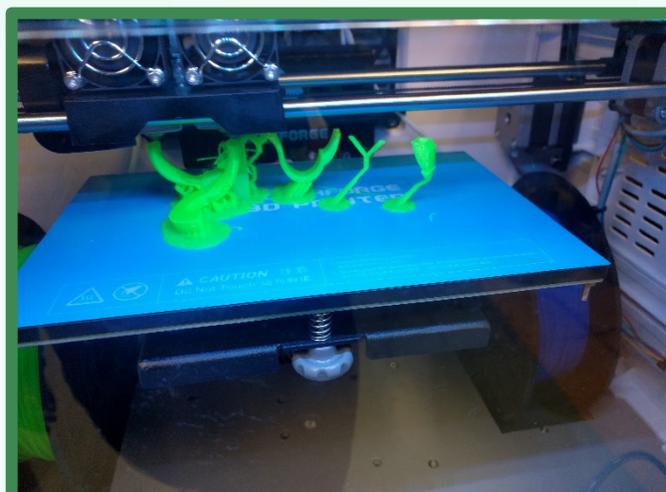
The Goizueta-Woodrow Wilson Enrichment Microgrant Program taught me a lot about collaboration. There are no other physics teachers at my school, so this was a great opportunity for me to learn about physics projects in other schools. The project itself has encouraged me to be creative and think outside the box. For every unit, I think about new ways to get students involved.

IMPACT ON EDUCATORS

I have been able to talk to other teachers throughout the school about new ways to get students engaged. The 3D printer is a great source of conversation and collaboration.

WORDS OF ADVICE

Be aware of how time-consuming projects like this can be. Pick something you are passionate about so that it is exciting for you to spend time on it.



This roller coaster was made by a team of two students. They designed it using the 3D modeling software, Tinkercad. We then 3D-printed it during class.

SUMMARY For my grant, I decided to get six digital microscopes that could accommodate a class of 30 students and various classroom supplies (i.e. whiteboards, erasers, markers, blank slides and cover slips). I was inspired to get digital microscopes and accessories for three reasons: (1) the microscopes at the school were outdated and non-functional, (2) many times students have issues learning to use microscopes on their own, and these microscopes could be used by multiple students at once, and (3) I wanted the students to experience science in a way that they never had before. The whiteboards and accessories are useful during class discussions, group work, and class presentations. My main goal was to increase student engagement in science and learning about microorganism by giving them the opportunity to see and observe them.

IMPACT ON STUDENTS When using the microscopes, the students are very engaged and eager to see the various things that either they or my mentor teacher and I prepare on the slides. They are always amazed that things that they can't see or are very small become visible when looked at through the microscopes. The students are also excited when they are told that we are going to use them and are always wondering when they will have the opportunity to use them again. In addition to the microscopes, the students also enjoy using the whiteboards and find them very helpful while in groups and when giving short presentations.

EFFECTIVENESS IN TEACHING Using the microscopes has improved my teaching by giving me the opportunity to bring to life what I am teaching the students in the classroom. For example, it is very hard to teach students about different microorganisms when they have never interacted with them or do not even know what they look like. Using a textbook and having the students write down notes and do worksheets is not enough for the students to connect to the material. Looking at these organisms under a microscope, especially a digital microscope, is something that the students will never forget.



Students observing protists (Stentor) under one of the digital microscopes. The image on the screen is what can be seen through the microscope lenses.

IMPACT ON EDUCATORS

I have been able to share my experience and information about the microscopes and whiteboards with other teachers in the science department. Administrators have also been in the classroom to observe and take pictures while we were using the microscopes. The school is even considering buying some digital microscopes to use after I take mine to my next school. It has been a joy to see the microscopes not only impact the lives of my students, but also to know that the students to follow them may have the opportunity to be positively impacted by them as well.

WORDS OF ADVICE

To other educators trying to use digital microscopes in the classroom: It is important to do research on the different types of digital microscopes and the kind that would work well for your class. I purchased compound digital microscopes with my grant because I wanted my students to be able to see microorganisms. However, if microscopes are needed for dissecting or looking at larger organisms, a dissecting digital microscope could be a better option for your class.

SUMMARY

My Goizueta-Woodrow Wilson Enrichment Microgrant enabled me to purchase two research-quality WiFi enabled microscopes for use in my classroom. The dissecting microscope enables visualization of details at a more macro level and the compound microscope is equipped with a 100X oil objective for clear viewing of microscopic samples. Coming from a research background, I was immediately frustrated by the poor optics of the microscopes available in my classroom. Biology can often be abstract, as we investigate phenomena that cannot be seen by the naked eye, and thus being able to visualize concepts such as cells and organelles makes the abstract more tangible. Another key feature of these microscopes is that they are WiFi-enabled, so students are able to capture what they see through the eyepieces on their phones or the class iPads. The ability to capture images on their mobile devices engages the students, enabling them to share their data with each other and to utilize the images in their lab reports as part of their scientific evidence.

IMPACT ON STUDENTS

I have utilized the microscopes for several labs. First, my Anatomy and Physiology class dissected an earthworm. They were able to bring their worms to the dissecting microscope and capture images with it. While all the students were engaged and interested in this experience, I noticed one student in particular, B, was captivated. He spent 20 minutes at the end of class with his worm at the microscope. He dissected out all of the hearts (worms have five aortic arches that act as pumping chambers) as well as the spinal cord. This was the most engaged I had seen B in the class, and from this point forward, he seemed more engaged as we moved through the body systems.

The second lab was with my Biology class as they were studying the phases of mitosis (cell division). We utilized prepared slides that showed cells in different stages of cell division and asked the students to identify and sketch the phases. This would have been impossible with the school's previous equipment, since the magnification and quality was insufficient. With the research-quality microscope the students were easily able to identify the different phases of mitosis.

EFFECTIVENESS IN TEACHING

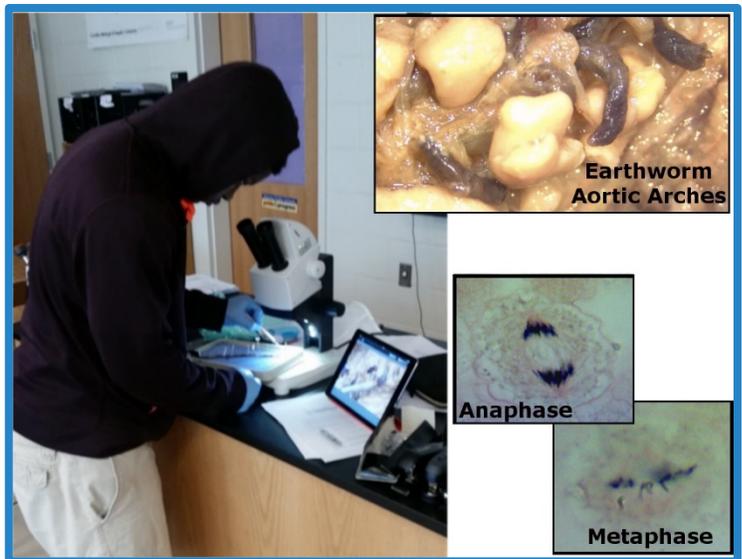
The funding has supported my teaching by broadening my ideas of what types of lab experiences I can offer my students. With high-quality research microscopes, the students are able to see the phenomena that we are studying at much higher resolution and much greater detail. I anticipate designing labs in the future that capitalize on these capabilities as well as utilize the social media features of the WiFi-enabled cameras.

IMPACT ON EDUCATORS

I have shared my microscopes with the other biology teacher in my department and she has been able to utilize them with her students. I intend to share my experiences, as well as the microscopes themselves, in my new school next year.

WORDS OF ADVICE

In addition to the microscopes, I bought an iPad that I bring in when we use the microscopes. I wish I had several more iPads so that multiple students could be observing the microscope simultaneously. This gives students access without having to install software on school iPads.



Student utilizing dissecting microscope to examine an earthworm. He isolated the aortic arches (inset). iPad enabled visualization of images. Lower inset are images from the compound microscope of cells in different phases of mitosis.

SUMMARY

I used my Goizueta-Woodrow Wilson Enrichment Microgrant for Vernier Lab Quest 2 interfaces and probeware. I purchased six interfaces and a variety of probes including pH, dissolved oxygen, conductivity, temperature, and stream flow. Although my placement school had general laboratory equipment, there was a lack of tools for testing environmental samples. With the probeware, the goal was to provide an opportunity for students to perform environmental testing and examine how humans and the environment interact.

IMPACT ON STUDENTS

Students enjoyed participating in lab work and the equipment has increased the number of labs used in the course work. Additionally, students strengthened their understanding of concepts through the hands-on activities. Rather than just reading about the topic, students were able to take measurements, make comparisons, and draw conclusions.

EFFECTIVENESS IN TEACHING

The funding has allowed me to bring the outside environment into the classroom. By performing more lab work, students had opportunities to use scientific practices. As Georgia implements the new GPS standards next year, the probeware will aid in addressing the scientific practices that are included in the standards. The equipment pushes me to think outside the box when lesson planning, finding new ways to introduce content in class that can incorporate the probeware.

IMPACT ON EDUCATORS

I have shared my experience with the probes with the Fellows in my cohort at GSU and the science faculty at my school. As I transition into my own classroom next year, I plan to share the equipment with the science department and my content team.



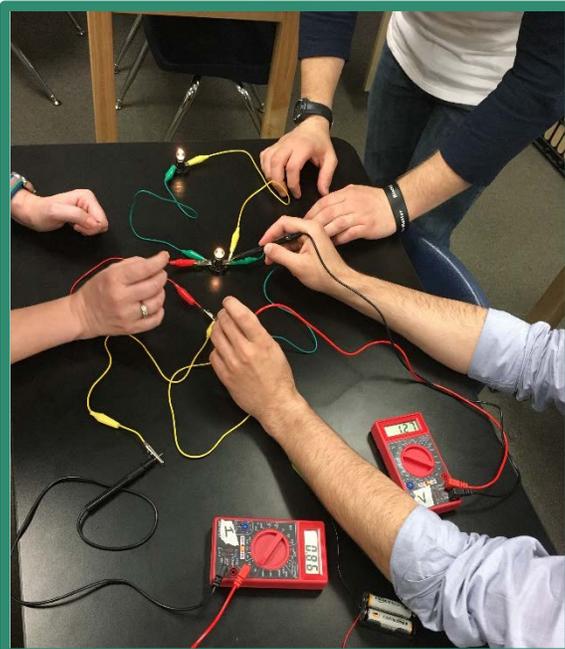
WORDS OF ADVICE

Plan ahead and take stock of the materials you may need in addition to the probeware. While environmental samples may be readily available, other materials may be necessary to perform experiments. Make sure to budget for these other costs in addition to the probeware equipment. Vernier offers training and other resources for educators that can aid in lesson planning and teaching students to use the probeware.

SUMMARY

Physics is a subject that can be overwhelming to students and one that they often view as abstract and irrelevant despite the fact that they experience physics every day. I believe that students at all levels—AP and on-level alike—benefit from the ability to use content in a laboratory setting and collect real-time data to either corroborate their own observations or revise their own misconceptions.

With this grant, I purchased laboratory and classroom equipment—including a class set of calculators and various materials for teaching kinematics, electricity, magnetism and optics—that enabled my on-level students to experience lab exercises that helped to illuminate concepts, extending and deepening their understandings.



Students utilize voltmeters and ammeters to discover and explore Ohm's Law and the relationship between current, voltage, and resistance in series and parallel circuits.

materials both with the other physics instructors at my school, but also on a county level, since all Gwinnett students must take physics.

WORDS OF ADVICE

Spend the time to reflect on how your students responded to, struggled with, and responded to the equipment and protocols you provide. Reflection in the moment (or soon after) is a critical part of the revision process needed to make sure that students are engaged but also learning!

IMPACT ON STUDENTS

There is truly no substitute for putting real equipment into the hands of students. Even when this equipment is a simple calculator, students thrive when they are given the tools they need to be successful. I was able to see this firsthand both in the engagement of my students during class and through their performance on formative and summative assessments.

EFFECTIVENESS IN TEACHING

The use of this equipment has impacted my ability to connect with my students and to connect them to the content in a myriad of ways. Having dedicated supplies in my classroom provided me with extra time with which my students could explore our relevant concepts using the hands-on equipment. These materials allowed me to push my curriculum toward a more Constructivist framework where students are creating their own knowledge and posing their own questions, something that is becoming even more critical as my district moves toward the Next Generation Science Standards.

IMPACT ON EDUCATORS

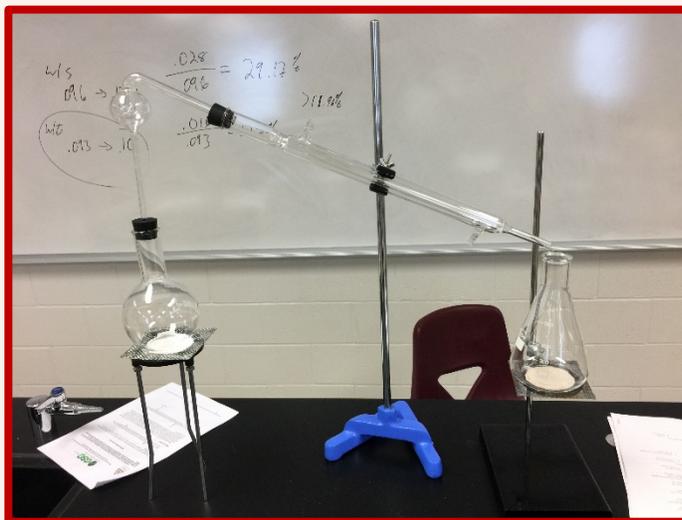
While many materials exist for physics education with upper level and AP students, relatively few are geared to more conceptually based on-level courses. I am hoping to share these

SUMMARY

My Goizueta-Woodrow Wilson Enrichment Microgrant was used to purchase a class set of distillation kits for my 9th- and 10th-grade chemistry classes. The impetus for this proposal was based on a standardized test called Gateway that the students must take in my school's district. This test requires students to write a document-based essay on science topics. Typically, the subject matter has been limited to biology; however, this year two of the topics were on solutions. I immediately saw the lab on fermentation of sucrose to ethanol as an excellent way to tie in all of the relevant concepts for students immediately before they were to take the Gateway exam. My intentions for the lab were to do the following: boost Gateway scores by providing students with a hands-on experience to review relevant concepts instead of drilling facts; provide a rigorous collegiate-level experience for my honors/gifted underclassmen; and spark interest in upper-level science by allowing students to see real-world applications of our standards.

IMPACT ON STUDENTS

The result of running this lab has added a greater level of buy-in to my classes. My students are asking more questions in the lab and have continued to make connections with what we did in our distillation to all the units that have followed. This shows me that the challenge of this lab has positively impacted the amount of critical thinking taking place in the classroom. The topic on the Gateway exam was solutions this year, so I will be looking at data over the next two years to analyze the effect this lab has had on their performance on this exam.



EFFECTIVENESS IN TEACHING

Being afforded the opportunity to offer an out-of-the-ordinary lab for high school students has forced me to comb through our standards in an effort to look for areas where we can use higher-level experiences to support the standards. In an environment where project- and problem-based learning is the foundation, this lab helped me as a first-year teacher to better scaffold students toward independently solving problems with the use of classroom content. The grant also afforded me the opportunity to strengthen and build relationships with my students and their parents, as they shared with them what we were doing in the classroom.

IMPACT ON EDUCATORS

I have set up a database where educators can share labs and feedback on those labs for core and elective science classes so that we can all create valuable impactful educational experiences in our classrooms. The additional equipment increased our efficiency in lab for all science teachers on my team.

WORDS OF ADVICE

I would encourage all educators, especially those in the STEM fields, to take the leap and try those lofty "I wish" ideas. Those are the experiences that keep you passionate about your work, and pay-off in engagement and greater student understanding!

SUMMARY

As a chemistry education student, I have learned about the benefits of inquiry-based instruction and 3D learning. Before writing the Goizueta-Woodrow Wilson Enrichment Microgrant proposal, I thought of equipment that would enhance my students' experience as scientists and give support for the inquiry model. Through the microgrant, I was able to purchase four deluxe chemistry kits from Vernier. Each kit contains an interface and seven probes with electrode support. With the conductivity probe, one of the projects I was able to create was a CSI project where the students identify an unknown substance from a crime scene and use it to identify the suspect.

IMPACT ON STUDENTS

As a result of the project, students got a chance to see how chemistry is used in the real world. Out of all the labs from the semester, many students stated that this project was their favorite. Weeks after moving on from that unit, students were able to recall the information and concepts because they saw it first-hand. The class discovered the properties of ionic and covalent bonds and discussed the data to make conclusions. Taking responsibility for their own education has helped the students commit the concept to long-term memory.

EFFECTIVENESS IN TEACHING

The Goizueta-Woodrow Wilson Enrichment Microgrant has allowed me to be a creative teacher. I plan for one or two labs a week and I differentiate based on ability.

IMPACT ON EDUCATORS

I have shared my plans and ideas for the Vernier lab equipment with other teachers at the school. I look forward to next school year when there are more opportunities to use the equipment in other classrooms.

WORDS OF ADVICE

When deciding on what to write the proposal for, think of what you would love to have throughout your teaching career. Also, plan ahead! Give yourself time to test out the project and equipment before assigning it to the class.



Students collecting the absorbance of several solutions of KSCN and $\text{Fe}(\text{NO}_3)_3$ and determining the equilibrium constant.

SUMMARY

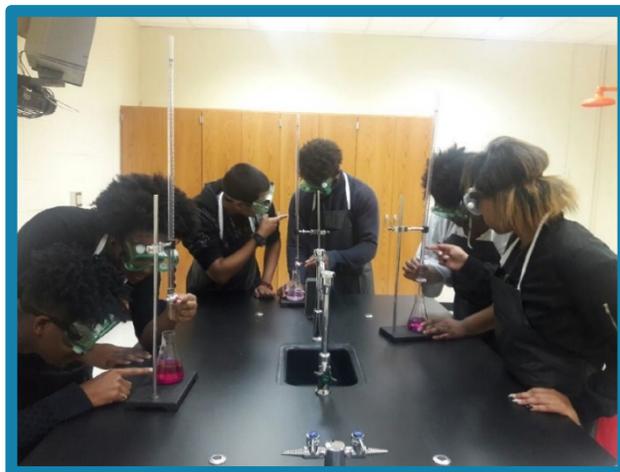
According to the U.S. Department of Education, low-income schools do not get their fair share of state and local funds. This leaves students who attend these schools with fewer resources, compared to students at wealthier schools. In science courses, this presents an even larger issue because many materials needed to conduct engaging and meaningful laboratory activities require funding, which may not be available. During my student teaching experience, I found this to be true, as my school had limited or nonexistent chemistry supplies. In particular, my school did not have burettes, which are needed to perform acid-base titrations. As a former analytical chemist and general chemistry laboratory assistant at Georgia State University, I can personally attest that performing titrations is a necessary skill for students' college courses and possible future scientific career. Hence, my proposal involved obtaining burettes so that students could perform titrations to implementing the scientific concepts learned about acid-base chemistry.

IMPACT ON STUDENTS

After the completion of this lab, there was a large positive student response. Students enjoyed this scientific investigation so intensely, they requested to do the lab again the next day, to achieve more accurate results. One student even commented this was her favorite laboratory of the semester. As a result of this laboratory, students were able to use what they had learned about calculating unknown concentrations of acids or bases and apply this to a real-world application.

EFFECTIVENESS IN TEACHING

The Goizueta-Woodrow Wilson Enrichment Microgrant has afforded me the opportunity to provide my students with exciting and applicable laboratory investigations, which is necessary for three-dimensional teaching. As Georgia embarks on the new Georgia Standards of Excellence, it is imperative that students can engage in scientific investigations to explore real-world phenomena. By having students learn science through scientific investigations and discovery, this will allow them to become more invested in their learning and become more connected to science. For future projects, I will extend this laboratory to a project-based learning activity, which will include Bluetooth pH meters. This will be a two-week project, in which students will determine the pH and acidic and basic concentrations of various household products.



IMPACT ON EDUCATORS

Not only did the acid-base titration laboratory catch the attention of my mentor teacher and other science educators, the other experiments and demonstrations which I was able to incorporate into the classroom with the microgrant money were also of interest to colleagues. In the future, I want to collaborate with other science teachers at my future school, to develop more labs and activities utilizing my equipment and supplies to motivate students to become more interested in science.

WORDS OF ADVICE

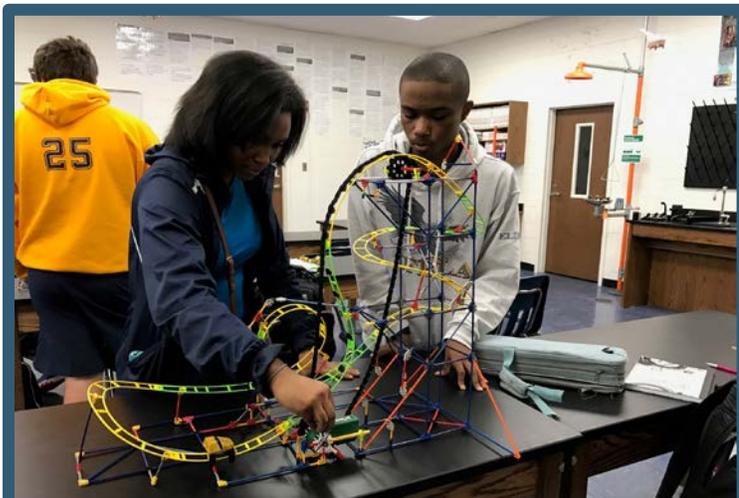
With performing acid-base titrations, allow the students to make mistakes and experience frustrations. It is very tempting to want to do things for your students. However, they need to learn to persevere and experience the unpredictability of science.

SUMMARY

My Goizueta-Woodrow Wilson Enrichment Microgrant allowed me to purchase class sets of LED Snap Circuits, Rover Snap Circuits, Edison's Light Bulb Kits, Hoverboards, Thames & Kosmos' Physics Workshops, and Lazer Maze. I was inspired to buy these supplies by my students. Two of my students asked if our school had hoverboards, because they wanted to learn all about them. For some of the other supplies, I had one kit that was my personal kit that students could use, if they finished their work early. I was surprised by how engaging they found these kits. Their excitement inspired me to want to have a whole class set of these supplies, so ALL my students could explore.

IMPACT ON STUDENTS

My students had fun using these supplies. Using the snap circuits, they were able to design their own circuits with different types of lights and/or a speaker. They were also able to play games with each other while using Lazer Maze and the hoverboards. At the end of the day, my students thought that if this is what scientists do (build stuff and experiment), then being a scientist is awesome.



My students built this roller coaster and are now testing to determine how mass affects its speed.

EFFECTIVENESS IN TEACHING

I am in the process of transitioning from being a traditional lecturer to a facilitator of learning. I give my students a goal and let them explore using the equipment to determine how to reach that goal. My students no longer just go through the motions of completing an assignment. Rather, they take ownership over it, they lead their own learning and explore topics into more depth than I expected.

IMPACT ON EDUCATORS

Three other teachers at my high school have used the lab equipment from the grant. After the four of us saw the effectiveness of teaching with the lab equipment first hand, I decided to present at the National Science Teachers Association's high school share-a-thon to explain to other teachers the impact that these particular supplies have had on my classroom.

WORDS OF ADVICE

Let your students take the lead and explore!

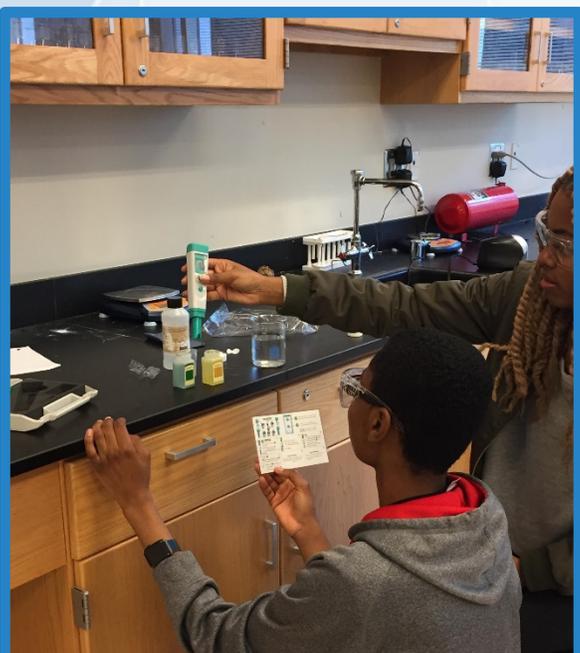
Jessica Carter

2016 Cohort | Georgia State University

Daniel McLaughlin Therrell High School | Atlanta, GA

SUMMARY

During my first semester of student teaching, I noticed that I had to borrow balances from other teachers in order to perform labs. I also noticed a lack of certain types of chemistry tools, like burets and pH meters. I wanted to be able to expose my students to the equipment I knew that students at other schools would be seeing in their classes. Most of my equipment was geared toward the acid-base unit of chemistry.



Students calibrate a pH meter in preparation of an acid-base lab

IMPACT ON STUDENTS

While we haven't gotten to the acid-base unit yet, I have noticed that throughout the year my students are more highly engaged and participatory in their own learning when they got to use real glassware, real chemicals, and perform actual experiments, as opposed to the virtual labs that are often used as a substitute due to cost. It is my hope that, by having pH meters available and being able to do titrations, my students will get a firmer grasp of pH and acid/base reactions than litmus paper or an online simulation would allow.

EFFECTIVENESS IN TEACHING

Having materials for students to put their hands on to perform experiments helps to increase student comprehension and engagement. Chemistry is such an abstract concept that making it concrete for students is so beneficial to their learning and impacts the effectiveness of my teaching.

IMPACT ON EDUCATORS

While my mentor teacher and I teach the only chemistry classes at the high school I am at now, I do intend to coordinate with other possible chemistry teachers at my new school to expose all of the students at the school to using the equipment and moving beyond virtual labs.

WORDS OF ADVICE

If possible, have the supplies shipped to the school where you are. I couldn't because of glitches in the delivery system at my school. I ended up with 25 boxes in my living room until I could condense them and deliver them to the school. I would also have included long-term storage in my grant, since I now need to find a way to store these pieces of equipment so that I can move them to my new school now that student teaching is complete.

I also wish I had thought to include chemicals for the titrations in my request. I knew the school had some acids in the stockroom but later discovered that some of them had expired and weren't usable.

SUMMARY

There are many ways to conduct lessons on electricity, conductivity, and circuits. You can always lecture to the students but I would much rather inject fun and creativity into it. My project involved several elements including laptops, Arduino kits, and Makey Makey boards that allow students to become engaged through creative means.

The Makey Makey kits are small, index-card-sized circuit boards that connect to a computer and work to almost override the keyboard and mouse. I first experienced these educational toys at a conference and was inspired to bring them into my classroom because other teachers, professionals, and I were having so much fun using them. The primary objective is to discover how circuits work and what is and isn't conductive, but there are countless other outlets that allow students to play, learn, and explore!

While the Makey Makeys work on any computer, they can also be used on the five laptops which were another part of the microgrant, along with Arduino starter kits. The Arduino is another small circuit board, but has a programmable microcontroller that allows students to learn about circuits and create unique projects while learning how to program. The Arduino has a huge online community of programmers, hobbyists, teachers, and students creating and sharing ideas and helping each other learn and connect.



A student uses the Makey Makey to play a game using bananas as the controls.

IMPACT ON STUDENTS

The Makey Makeys are a huge hit, and students regularly ask for them when they finish their classwork. When they were first introduced, students were given a tableful of different materials to use, including bananas, pencils, and toothpaste. They needed to determine how a circuit is connected and what materials conduct electricity. It is this curiosity, questioning of preconceptions, and engineering mindset that I look to instill in the students. With the Arduinos, I hope to continue to engage students by providing additional resources and outlets for creativity. They can build what they like, program something unique, and take an active role in their education and be inspired to learn.

EFFECTIVENESS IN TEACHING The devices bring technology into the classroom that students might not be aware of or be able to experience if not for the funding I received. Students are excited to come to class and play with all the toys. They are more engaged than they would be with traditional lecture and enjoy the hands-on activities and experiences the microgrant has provided.

IMPACT ON EDUCATORS Other teachers ask to use the Makey Makeys which I am glad to share. My students have found it interesting and I hope other educators will recognize that and incorporate the hands-on activities in their classes as well.

WORDS OF ADVICE The Makey Makeys are fun! Part of that is because they allow the students to play a computer game. To keep them from simply playing a computer game, you are challenged to get the students to build on what they have done so far and develop new uses for the technology.

Linda J. Harris

2016 Cohort | Georgia State University

Daniel McLaughlin Therrell High School | Atlanta, Georgia

SUMMARY

I decided to purchase a portable mathematics technology lab with my Goizueta-Woodrow Wilson Enrichment Microgrant. The portable mathematics lab consists of a 3D printer, iPads, touchscreen laptop, and color printer. The portable lab allows students to have the latest technology with internet access in their classroom at all times for enrichment, remediation, and exploration.

IMPACT ON STUDENTS

The students live in a technology-driven world and are very comfortable learning new technology. My students were very excited to see more real-world and advanced technology in their math class as opposed to just advanced calculators.

EFFECTIVENESS IN TEACHING

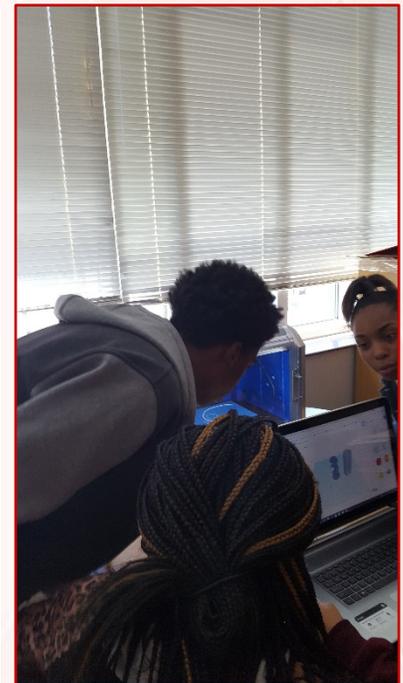
Connecting technology to math engages students in a way that changes the role of students from users to creators. This kind of paradigm shift lends to deeper learning. “Cognitive science has shown that what ends up in a learner’s memory is not simply the material presented – it is the product of what the learner thought about when he or she encountered the material” (Willingham, 2003, p. 77).

IMPACT ON EDUCATORS

As an educator, incorporating technology allows me to bridge my experiences in corporate information technology with classroom instruction for deeper, multidisciplinary teaching, making real-world connections. Other educators can incorporate their own real-life experiences. Technology also allows educators to incorporate culturally relevant learning by increasing access to materials and information.

WORDS OF ADVICE

The only way to meet students “where they are” is to allow student input into project development. This is especially true for technology-based projects. Student input allows the teacher to determine what is needed for student engagement, interest, and productive struggle.



Students proactively working together to learn 3D printer operation and drawing design.

SUMMARY

As a mid-career professional, I decided to bring my STEM background into the classroom. The 2016–17 Goizueta-Woodrow Wilson Enrichment Microgrant allowed me to incorporate instructional technology across STEM secondary classrooms. Currently this opportunity has enabled me to incorporate virtual reality technology in secondary science courses at Meadowcreek High School.

IMPACT ON STUDENTS

The Goizueta-Woodrow Wilson Enrichment Microgrant for the implementation of virtual reality technology across STEM secondary classrooms has impacted underrepresented minority students in Meadowcreek High School—specifically, Honors Biology 9th-grade freshmen and AP Environmental Science 12th-grade seniors. Students have been enriched with the experience of using virtual reality headsets to view VR content including pictures, videos, apps, and games compatible with Google’s card-accessible VR platform. Evidence collected suggests that the devices have created a positive impact on students’ levels of engagement, motivation and self-efficacy when performing language demands for specific learning tasks.



Implementation of Virtual Reality technology across STEM secondary classrooms.

EFFECTIVENESS IN TEACHING

The Goizueta-Woodrow Wilson Enrichment Microgrant has supported my Woodrow Wilson Teaching Fellowship by providing me with the opportunity to expose a high-need school’s STEM students to novel instructional technology. Specifically, my teaching skills have improved

because of the enrichment program not only by learning to use the headsets in STEM secondary instruction, but also by implementing the devices during professional higher education workshops and by facilitating extracurricular activities at the Information Technology Academy in Gwinnett County Public Schools.

IMPACT ON EDUCATORS

The Woodrow Wilson Foundation has recorded and published online videos of my students using VR technology inside the classroom, and I hope this will help disseminate the impact and encourage other educators to try headsets. Moreover, I have facilitated the use of the devices on the 9th Grade Rising Nights and with the Information Technology Academy for the Meadowcreek cluster, and have provided professional higher education workshops to Piedmont College’s School of Education faculty members.

WORDS OF ADVICE

Recommended VR phones must have at least 5 inches and gyroscopic sensor. To create VR content for any curriculum, install the cross-platform app CoSpaces.

SUMMARY

The objective of this project is to provide increased access to instructional technology in modular trailer classrooms that typically have limited access to technology. In an increasingly digital society, it is, more than ever, crucial to provide students with opportunities to learn 21st-century skills through use of technology. The initial proposal was written for 11 iPad minis, storage for these devices, and a Pico projector and Apple TV setup; due to discounted prices for some of these items, I was also able to purchase a class set of Casio scientific calculators with multi-view functionality.

IMPACT ON STUDENTS

Students are empowered by access to technology. The scientific calculators may seem like simple technology; however, they have had a tremendous impact on student learning. The students are not held up with simple calculations and can instead focus on the relevant content. They have also been able to use the iPads to take control of their own learning through self-selected enrichment and remediation. Students have learned how to use these devices in a meaningful way that supplements their content knowledge and that increases engagement and motivation.

EFFECTIVENESS IN TEACHING

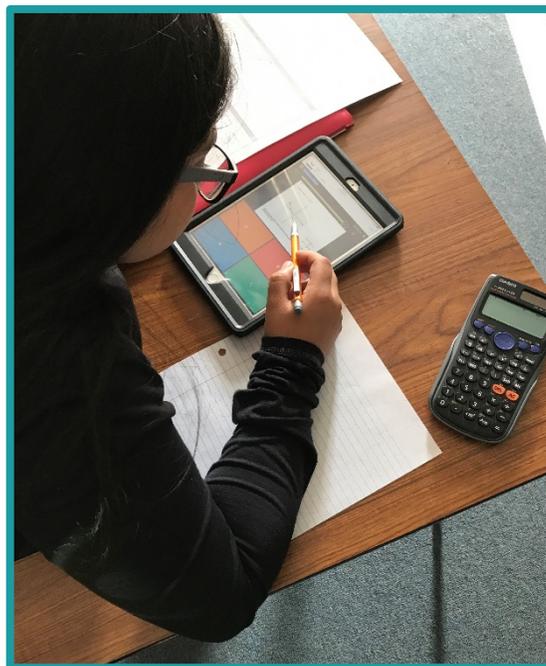
Having greater access to technology in my classroom has enabled me to think outside of the box in my teaching. I am constantly researching technology-centered and technology-enhanced strategies for teaching and learning. I have been able to make my teaching more student-centered, leading to the growth of more independent and self-reliant learners.

IMPACT ON EDUCATORS

Whenever I try something new in my classroom related to these technologies, I relay my experiences to my content team at MHS. As a result, many of my colleagues are interesting in finding grants to fund technology in their own classrooms.

WORDS OF ADVICE

Implement these technologies as early and as often as possible during the school year to create a classroom climate that thrives on the development of 21st-century skills.



Student working on an online Quiz assignment using an iPad mini and Casio calculator.

Marshai D. Waiters

2016 Cohort | Kennesaw State University

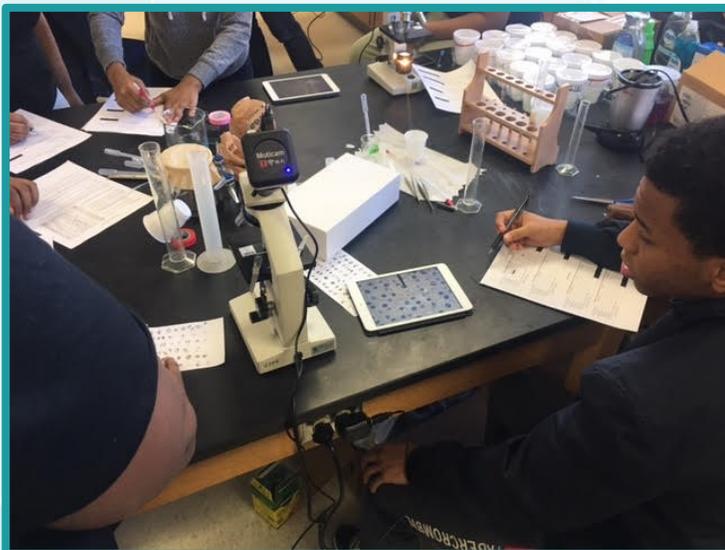
Marietta High School | Marietta, GA

SUMMARY

I requested a total of 15 iPad minis, 12 whiteboards with dry erase marker sets, and three reference books for teaching with my Goizueta-Woodrow Wilson Enrichment Microgrant. My inspiration behind completing the proposal was the opportunity to bring resources to my field placement classroom to help my students to learn throughout the semester. For the reference books, I knew that having those resources would also serve in providing me valuable information to become a better educator for not only my current students, but my future students as well. The goal of my project was to incorporate technology and ways for my students to brainstorm inside the classroom. The iPads were used for various classroom apps to teach and learn content, and the whiteboards were instrumental in helping students to brainstorm their ideas and adjust as necessary, which was beneficial when students were constructing scientific arguments.

IMPACT ON STUDENTS

I have seen an increase in student engagement when external resources are used within the classroom. Students are accustomed to presentations on the board and written assignments. Incorporating an iPad during a lab activity and allowing students to draw and write out concepts on a whiteboard increases their interest. In a conversation with students, I asked if using the whiteboards was helpful to their learning and whether they would prefer to use them more. One student responded that the boards were more interactive, while another student said that it worked well, helping them when they write out their evidence-based arguments for class. Regarding my teaching, I have been able to apply the methods and suggestions outlined in the reference books to my teaching, including using my strengths during my instruction and having resources available when making choices as it pertains to my lesson planning. Going into my first official year of teaching, I think that these resources will assist me in becoming a better instructor for my students.



Students working on a mitosis lab using iPad minis to observe microscope slides.

EFFECTIVENESS IN TEACHING

This funding has allowed me to purchase necessary materials to implement into my classroom to better serve my students in their learning. It has also provided additional support through meeting other educators who are currently implementing similar projects into their classrooms and to see how they are utilizing these tools. As a teacher, I have been able to brainstorm innovative ways to utilize the materials in my room to introduce content to my students, and speaking with other educators I have been able to take notes on effective methods that are working within their classroom.

IMPACT ON EDUCATORS

I have been able to talk to other educators about what I am doing in my current classroom with my cooperating teacher. In our weekly biology meetings, we discuss things that are going well and not so well in order to learn better practices from each other. As I continue teaching, I plan to continue to share my success and flaws pertaining to

implementing these projects in my classroom with educators in my school setting, as well as elsewhere, through networking and conference opportunities.

WORDS OF ADVICE

I would say always be open to the latest ways of incorporating electronics into your classroom. Technology is ever-changing and our students use it daily, so as we move forward in education, we must realize that technology will always be included. Having a strong and diverse network of educators, from both the same and different content fields, will be beneficial in not only finding current ways to implement your own project, but also introducing new projects that could be implemented in your classroom.



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