Summary

This marks the end of our fourth year running a garden-based science program partnership between the Cultural Arts Coalition’s long-running Science Academy and Working Food’s Youth Garden Program. Our two established gardens at community centers in Gainesville continue to grow and provide a creative space to explore gardening, food, cooking, science, nature, and art.

Program partnerships have improved the content and delivery of educational materials. This has allowed us more time to explore the many creative approaches to learning that a well-run garden can offer. Visual and performing arts, as well as cooking and nutrition lessons have deepened our relationship with our students, demonstrating the interconnections between frequently isolated subject materials.

Background

The long running George Washington Carver Science Club (GWCSC) run by the Cultural Arts Coalition (CAC), added gardens as a learning tool to their program in 2016. Starting at the Wilhelmina Johnson Center, Working Food (then Forage) started a little garden on the lawn of the community center. Every year since then, from October through May, we have tended the garden and used it to help teach a diversity of age appropriate subject material with a heavy focus on science. Prior to this garden, conversations with the kids about the importance of eating vegetables was always met with little to no enthusiasm. Planting a garden and harvesting and preparing food from it was a new experience for the majority who had never even been in a garden.

We expanded to the Clarence R. Kelley Center (CRK) in the Duval Neighborhood in the 2017-18 school year, recognizing that this center was most in need of the enrichment. This location operates much differently than the CAC as it provides a daily gathering space for youth and adults that receive various services, and is run by the City of Gainesville with significant help from the Greater Duval Neighborhood Association (GDNA). This center helps a very underserved and low-income community that faces significant housing, crime, and health issues. We learned quickly at this site that we couldn’t replicate activities developed with the CAC students due to time limitations, smaller and less productive garden space, city staffing issues, and at times severe behavior and attendance issues. The attention span, commitment, and curiosity of this group of students was a challenge at times. In response, we kept educational activities quick and engaging, interspersed active games, and planned more projects for them to take home when possible. In general, we focused more on the basics of task
completion, positive recognition, and engagement rather than trying to ensure that participants learned a specific concept. Team and character building were much more important with this group of kids and accordingly, our approach was more measured and flexible. Our hope is that with time, continued commitment, and more returning students each year, the participants at CRK will feel more pride and excitement about learning from and tending their garden.

As our program has had time to grow and develop, we’ve incorporated partnerships with other organizations that have greatly improved the content and interconnectedness of our material. Cooking and nutrition education were delivered each month by the University of Florida’s Family Nutrition Program (FNP). Garden produce was incorporated in the meals and students were able to participate in all aspects including harvesting, chopping, stirring, plating and eating. FNP was responsive to our request to make the educational component more interactive and fun by incorporating games into their material. The students enjoy learning to prepare meals and are often eager to take home recipes to share with their families. FNP also supports our programing by supplying basic garden materials that help to stretch our budget - they contributed about $500 worth of supplies this year. We also partnered with Wayfaring Painter to bring monthly art activities that incorporate what we’ve learned in the garden through visual arts. Clay molding, paper-making, journal crafting, murals, painting and more were enjoyed this year.

We’ve observed what the research tells us about youth gardens - that they inspire healthier eating choices, increase physical activity, encourage exploration and understanding of the natural world, and improve social and cognitive skills as well as test scores. While we cannot attest to whether the garden has helped their grades or test scores, we have seen the connections inspired when they experience in real life the concepts they learned in the classroom. Pollination, photosynthesis, life cycles, climate, weather, and soil life make more sense and come to life, when experienced.

**Program Evaluation**

Following the initial development of program evaluation tools during the 2018-19 school year, we refined these tools over the summer. Evaluation tools are polished and user-friendly, and ready for roll-out when our programs are back up and running again.

These evaluations were developed in collaboration with partners at UF, including Dr. Marilyn Swisher, a professor in Family, Youth, and Community Services, Cody Gusto, a PhD student in Agricultural Education & Communication, and Liliane Poincon, a Masters student in Family, Youth, and Community Services. We had assistance with our IRB
application from Dr. Dale Pracht, an assistant professor in Family, Youth, and Community Services.

What Grows in the Garden

We choose plants we know will grow well, present a mix of familiar and new plants, provide color, diversity, taste, are attractive to pollinators, and provide the examples we need for lessons. This year we grew collards, kale, Asian mustards, snow peas, broccoli, carrots, cucumbers, radishes, beans, sweet potatoes, potatoes, tomatoes, dill, cilantro, garlic chives, calendula, zucchini, yellow squash, okra, sunflowers, and marigolds. We added a perennial section to both gardens as well with pigeon peas, moringa, bananas, and different pollinator plants. Our heirloom Yellow Cabbage Collards were a big success this year giving us more than we needed, so the children harvested and delivered plenty of extra to the Bread of the Mighty Food Bank!

Activities and Lessons

The garden provides a living laboratory and classroom where we explore first-hand, natural lessons in biology, chemistry, and physics. We often supplement the lessons and activities by bringing in additional materials and supplies. For example, pre-collected insects, plants, or mushrooms that add diversity to what is not possible to find in a short time-frame and limited space onsite. We always have magnifying glasses and little containers available to look at things closer, and encourage the kids to explore, ask questions, and take time with something that grabs their attention. We offer a mix of garden maintenance work and STEAM-based lessons and activities that complement and reinforce what they learn in school. We add movement and kinetic learning, such as games, songs, and dance, to keep the students engaged and excited.

This year was a challenge. Our Youth Gardens Coordinator, Jesse, had severe pregnancy complications and was placed on medical leave at the end of October, only two weeks into our garden programming. She had her baby two months early in November, and then went on maternity leave. She returned in late February, only to have schools, and our programs, close in mid-March due to Covid-19. This year was a lesson in perspective and flexibility. Over summer 2019, we created a more streamlined curriculum for our gardens as well as materials for evaluations. We look forward to seeing them both in action in the future, as they were not able to be fully rolled out this year.

Our Garden Intern, Jenna, worked tirelessly with the students in the garden each week, sharing her natural excitement and enthusiasm for growing things. Between Melissa (the
Community Programs Director) Jenna, and our partners FNP and Wayfaring Painter, the students received a great deal of love and learned a lot, even if it was different than we planned.

After Covid shut down our normal operations, we changed gears but were determined to keep connecting with our kids. We delivered a total of 284 individual activities to 32 students at their homes. Activities were designed to be easy to do without adult assistance or computer access. For example, some of the kits we distributed were - building insect aspirators or “bug-suckers” to collect live insects to learn about, pressing flowers and leaves to make suncatchers, germinating seeds in window displays and making observations about growth patterns, building birdfeeders and learning about neighborhood birds, and building mushrooms out of clay to better understand their structure. Students each also received a flowering plant to care for. We loved hearing all of their excitement about these home deliveries. We were especially happy to hear about one student who has continued to bring her plant outside with her each day to get sun - it’s about to flower!

In addition, this summer we brought two online cooking classes and one online science class to high school students involved in the GDNA’s Summer Sling program and the CAC Environmental Ambassadors program. Kits with ingredients and supplies were delivered to students’ homes, and they tuned in through Zoom to participate. We also taught two socially-distanced outdoor classes to the Environmental Ambassadors – one on seeds and composting at Grow Hub, and one on soil health at the WJC garden.

Along with these non-traditional activities, we still had lots of fun in our gardens this year. Here are a few examples of what we learned.

**Soil health**

- Using our well-established worm bin, we studied earthworm biology using diagrams and live worms to learn about their digestion, food needs, and locomotion.
- We played a fun relay game to learn about things that decompose vs. things that don't.
- A special field trip to Grow Hub gave another opportunity for both groups of students to learn about decomposition and compost, and see the larger composting operation there.
- Students learned about various ways to enrich the soil and plant health with organic materials that they applied themselves. This included worm castings, fish emulsion, mushroom compost, chicken manure (affectionately called chicken “dookie”) and lots
and lots of mulch! After a few weeks of garden club, kids anxiously squabble over who gets to add the stinky stuff to the garden!

**Population Dynamics**

- Using the onsite worm bin at WJC, students learned the methodology for studying changes in animal populations, and how those changes might indicate the health of an ecosystem. The worm bin was sampled periodically throughout the year and students counted the number of eggs, cocoons, juveniles and adults. In this process, principles of the scientific method were used and discussed including the importance of replication and consistency in performing a scientific study. Students even learned about subsampling after counting all of the cocoons in the sample proved too difficult to do accurately. Making these real-time adjustments added to the experience of learning about the process of science, and what it means to be a scientist.

**Food Preparation & Nutrition**

- Each month at both sites, FNP visited our gardens for nutrition and food preparation lessons. The kids were actively engaged throughout the entire process from harvest to food preparation. They learned how to properly wash and chop vegetables, and how to prepare tasty sauces and sautées.
- They learned about My Plate, the take-away being that half their plates should be covered with fruits and veggies.

**Math and Measuring**

- While selecting plants to put in their gardens, students read seed packet instructions for spacing, and had to figure out how long their rows were, and how many plants they could fit into the row.
- When fertilizing, students measured the amounts of liquid fertilizer to add to a watering can, and how much chicken manure to add to each row. The process of measuring liquid fertilizer is a great real-life example of the use of ratios in measuring.
- For food preparation measurements were key, and kids took the lead in reading and following the recipes closely. In some cases, recipes were increased in size to feed all the students, and we had a real-time learning process in multiplication.

**Seeds**

- On the first day after we harvested sweet potatoes, the summer cover crop of cow peas was also harvested, and many of these plants had gone to seed. The
kids really enjoyed shelling them, in fact they started without us even suggesting it! This process helps them learn about the life cycle of plants, the anatomy of a seed, and a special look at the “belly button” of the seed (known as the hilum) which was easy to see on the peas as they were shelling.

- We observed many different types of seeds from windblown dandelions to avocados to coconuts and matched them to their dispersal mechanism.
- We continued learning about seed dispersal through an activity in which we imagined we were plants trying to disperse our seeds and then designed seeds and dispersal mechanisms using lots of repurposed materials. There were seeds that flew on wings, shot like cannons, and floated on water. There was even one seed that just smelled very good to bears!
- On our special field trip to Grow Hub students learned all about seeds and seed saving.

Art

- One of the first activities was creating their own journals using suminagashi to decorate the covers. Kristin from Wayfaring Painter used vegetable ash dye that floats on top of water that creates a marbling effect on the paper.
- Students made self-portrait collages empowering them in their work as scientists, artists, and gardeners.
- As part of our evaluations, but also as a fun exercise, students used their imaginations to draw a scientist, including information on what they study and what they are like as people. It was beautiful to see the array of black and brown, male and female scientists of all sorts!
- Students painted new signs for both of the gardens, including a name sign for the newly named “Garden of Eatin’” at CRK.
- We made beautiful food art, cutting shapes out of the multicolored greens from the garden and “gluing” them together with hummus before eating them.
- In our Explore at Home Kits, students made beautiful sunprints and pressed-flower suncatchers.

Biology

- Flowers from the garden and elsewhere were observed under the dissecting scope. They viewed pollen up close and observed how it stuck to the sticky-stigma.
- Students learned about plant structure through their work in the garden, and we discussed which parts of which plants we eat – leaves, stems, roots, flowers,
fruits, and seeds. We also learned about the roles each of those parts play in a plant’s life cycle.

- We examined the root systems of plants growing in different areas of the garden, and of weeds growing outside of the garden with its regular maintenance and watering.
- We learned about perennial and annual growth habits through installing and maintaining a small bed of perennials – pigeon peas, moringa, bananas, and pollinator-friendly species such as native red sage.

**Scientific Process**

- The processes of the scientific method are reinforced and used throughout the year as students are encouraged to write observations, ask questions, make counts and record data, and look at their results. Examples included counting worms, eggs, cocoons and replicating the process for data analysis, testing different soil erosion treatments and comparing results to make conclusions about the natural world, keying out mushrooms by examining closely their features, and using a microscope and magnifying glass to observe closely.
- Weather data was recorded from their weather station and they looked at correlations between the weather and the health of their garden.

**Final Thoughts**

The WJC garden now rests in a small planting of cowpeas for the summer, with a heavy layer of wood chip mulch that will build the soil and keep it protected during the quiet months of summer. This was the last year for the current Clarence R Kelly garden. We are excited that the new Center being built this year will include a brand new and greatly improved garden space for us. We attended the planning meetings and met separately with the City to design an outdoor learning space and garden that we are looking forward to using in 2021. The new garden will be larger, fully fenced, and have permanent tables and seating, as well as trellises. Most importantly, we will have permanent irrigation for a better-maintained garden!

While this year was a struggle in many ways, we learned a lot alongside our students and became stronger for it. We have expanded our toolbox and developed creative ways to connect students to nature even when they are not able to be in the garden with us.

As always, we are grateful for our partnership with the long-standing Cultural Arts Coalition’s George Washington Carver Science Club which makes our youth gardens possible. We are so grateful for the financial support of the Lydia B. Stokes Foundation, which has allowed this program to grow again this year. We also received support this year from the University of
Florida Medical Guild and Whole Kids. Thanks to these generous grants we were able to provide these important and impactful programs. We are looking forward to more garden and science experiences in the coming years! We’re also hopeful of the possibility of expanding to more community sites in the years to come, through leveraged partnerships with other community collaborators, such as the City of Gainesville Parks and Recreation Department, the Greater Duval Neighborhood Association and Southwest Advocacy Group.
Clockwise: 1) Students pose with healthy greens they grew in the spring at WJC. 2) A student take a break building beds with compost and chicken manure at the beginning of the fall season at CRK. 3) Working as a team to remove sweet potatoes at the end of summer at WJC. 4) Posing with some of the sweet potato harvest at WJC. 5) Posing with the little baby plants freshly planted for the spring season.
Healthy Eating!

Clockwise from top left:  1) Snacking as we work at the WJC garden.  2) Making healthy after school snacks with the Food & Nutrition Program at CRK.  3) A student enjoys some “skittle plant” (sorrel) at CRK.  4) Food art (a butterfly) using fresh greens from the garden and hummus as glue.  5) If they grow it, they’ll eat it! A kale salad fit for kings about to be enjoyed by students at WJC.
Clockwise from top left: 1) A student at CRK looks at the reproductive parts of flowers from the garden using the dissecting scope. 2) New signs for the Garden of Eatin’. 3) Students take the temp of compost at Grow Hub on a field trip. 4) Learning about honey mushrooms with a visiting mycologist. 5) Learning about worms as we track their populations by counting eggs, cocoons, juveniles & adults.
Coping with Covid

Clockwise from top left: 1 & 2) Student pose with their plants and Explore at Home Kits delivered to their homes. 2) A student takes a moment with his favorite mustard plant that he grew from a tiny transplant. His face summarizes our sadness at an early end to the garden season. 3) Another student with their kit delivery. 4) A snapshot of some of the packaged kits. 5) A zoom cooking class teaching how to make a variety of souffles.
Thank you!