

Impact of D.C. Farm to School Network on Nutrition Education and Urban Food Security
Among District of Columbia Public School Students: Prospects and Barriers

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Abstract:

At a time when childhood obesity rates and malnutrition are at an all-time high, stakeholders across the board are attempting to find creative solutions to this complex issue. The first part of this capstone examines the Farm to School Network in the District of Columbia and its impact on addressing food security and nutrition education among D.C. Public School and D.C. Public Charter School students. This study analyzes local policy initiatives and utilizes participant observation to determine areas of success and barriers to more effective programming. These analyses found that strong institutional support within the city government and coalition building provided a framework for success, the absence of consistent messaging and lack of emphasis on student autonomy stood as barriers for the programming. The second part of this capstone attempts to address these barriers in a proposed two-week school garden curriculum for 3-5th grade students with an emphasis on place-based education and student-led investigatory activities.

I. Introduction

Children in the United States today are experiencing the highest obesity rates in history. With the dramatic increase of processed and high fat foods in the average American diet, this has had a noted impact on the health and well being of American children. Even more disturbing are the trends at the intersection of poverty, obesity and access to food. Nowhere is this more apparent than in school lunch and breakfast programs in schools in low-income communities. Many children qualify for free or discounted school breakfast and lunches, which does provide them with food to get them through the school day, however often this food is highly processed, packaged and lacking in nutritional value, which merely fuels the vicious cycle of poverty and

malnutrition. Additionally, serving these types of pre-packaged foods creates a disconnect between the children and where their food is coming from.

However, despite these structural forces, many have discovered that school and the classroom are the ideal places to tackle these issues, and the National Farm to School Network was created as a response to these issues with the mission of implementing farm to school partnerships in schools across the country to create strong regional food systems and ensure the health of children, farms, the environment, economy and communities. In recent years a burgeoning farm to school network has established itself in the District of Columbia incorporating programs into schools of all levels of education across the city. These programs range from citywide events and workshops, building school gardens, and creating partnerships with local farmers to increase the access to fresh produce in school breakfasts and lunches for school children.

Those involved in the DC Farm to School Network face intense challenges. Forty-three percent of all D.C. school-age children are obese or overweight, 12.6% of D.C. households qualify as “food insecure,” and the estimated annual health care costs associated with obesity in D.C. are over \$372 million.¹ However, a growing coalition has emerged to confront these problems on the overlapping fields in which they occur – hunger, nutrition, environment, education – and together with local and federal policy makers have established a comprehensive model for incorporating higher standards of food, nutrition and environmental literacy into DC public schools and public charter schools. The purpose of this paper is to identify the unique successes and obstacles of the Farm to School movement in D.C. by answering the following questions: To what extent has the DC Farm to School Network made a difference in increasing

¹ “Why the Act is needed.” 2011. DC Healthy Schools Act. <<http://dchealthyschools.org/whats-in-the-act-2/draft-why-does-the-healthy-schools-act-matter>>.

access to healthy foods and to D.C. public school children? In what ways has this movement experienced success? What are the obstacles to expanding these programs and partnerships? Through participant and observation research as well and thorough study of primary source documents, I argue that the success of the D.C. model is predicated on strong local policy - the D.C. Healthy Schools Act – and supplemental support due to strong institutional support, strong community coalitions, a sustained funding model, and an emphasis on professional development; however, the program still faces many challenges and there is room for improvement moving forward.

II. Local Policy: D.C. Healthy Schools Act

I argue that the strength of the D.C. Farm to School Network in addressing food security and nutrition education are highly dependent upon the D.C. Healthy Schools Act (HSA), a piece of local legislation that was passed by D.C. City Council in April of 2010.² The HSA addresses a broad array of issues as illustrated in its five titles that guide policy: School Nutrition, Farm to School Program, Physical Education and Health, Environment, and Health and Wellness.³ From these titles alone, it is clear the HSA approaches youth health and wellness from a holistic angle, instead of a more traditional piecemeal policy approach. This is especially evident in the policy's definition of sustainable agriculture, which reads:

“ ‘Sustainable agriculture’ means an integrated system of plant and animal production practices having a site-specific application that will over the long-term: (A) satisfy human food and fiber needs; (B) Enhance environmental quality... (C) Make the most efficient use of nonrenewable resources and on-farm resources... (D) Sustain the economic viability of on farm operations; and (E) Enhance the quality of life for farmers and society as a whole.”⁴

² “History of Farm to School in D.C. Healthy Schools Act.” <<http://dchealthyschools.org/hsa-resources>>.

³ Healthy Schools Act legislation

⁴ Ibid 3

With this systems-thinking approach, the policy sets its tone and intention: childhood obesity and hunger are multi-dimensional problems, and therefore require equally diverse solutions.

While the HSA covers a plethora of important issues related to school health, nutrition, and education, a few programs are particularly relevant to the discussion surrounding food security and nutrition education. One example is economic incentives for sustainable food purchasing for schools and reducing the financial burden of school meals on low-income families. The HSA states that any D.C. Public School (DCPS) or D.C. Public Charter School is required to serve free breakfast to all students, and to eliminate the co-payment in schools where of 40% of the student body qualifies for federally-reduced meals.⁵ By reducing this co-payment, under the HSA these schools will be reimbursed by the Office of the State Superintendent of Education (OSSE) with \$7 per student.⁶ The purpose of this reimbursement model is to increase participation in school meals and to reduce the financial hardship on low-income families of DCPS and D.C. Public Charter Schools. Before HSA, co-payments for federally-reduced meals could range from 20 cents at DCPS up to 40 cents at a D.C. Public Charter School, which over a year could add up to over \$360.⁷ This portion of the act is particularly pertinent as over 70% of D.C. students qualify for free and reduced-price meals.⁸ Schools that are found in violation of these standards, and others as set forth by the HSA, will be issued an initial warning, and afterwards may be imposed a penalty of \$500 paid to the Healthy Schools Fund.⁹

As such, many of these students are eating two or three meals a day at school, which local D.C. policymakers saw as an opportunity to enhance the nutrition of school meals. The

⁵ Ibid 4

⁶ Ibid

⁷ "Why the act is needed." (2011). < <http://dchealthyschools.org/whats-in-the-act-2/draft-why-does-the-healthy-schools-act-matter>>.

⁸ Ibid.

⁹ Healthy Schools Act Legislation 8

HSA provides economic incentives for D.C. schools to make food-purchasing choices that are also nutritionally balanced. The HSA states that school meals must meet or exceed federal nutrition standards, which mandates: a different fruit and vegetable each day of the week, at least one serving of whole grains each day, milk offered everyday, and meals offered with limited sodium and saturated fat.¹⁰ Schools that follow these guidelines are reimbursed by OSSE 10 cents for every breakfast meal and 10 cents for every lunch meal.¹¹ In addition to expanding access to school meals as previously discussed, the HSA aimed to enhance these meals nutritionally as well.

Beyond merely securing foods high in nutritional value, additionally HSA policies address health and wellness through other means such as the Farm to School and School Gardens programs. The Farm to School title strengthens the existing network that existed in D.C. prior to the HSA by encouraging schools to source locally – defined as grown in D.C., Virginia, Maryland, Delaware, West Virginia, Pennsylvania, New Jersey, and North Carolina – by giving a five cent reimbursement per meal in which at least one component is unprocessed and locally sourced.¹² Sourcing locally not only increases the nutritional value of the school meals, but when combined with a strong farm to school educational component has the opportunity to connect students more closely to place; examples include examining what it means to eat seasonally and meeting a regional farmer.

Part of this goal of closer connection to food and student empowerment is manifested in the HSA through its focus on School Garden Programs. The HSA aims to “establish gardens as

¹⁰ “Enhance Nutrition of School Meals.” (2011).

http://www.dchunger.org/pdf/dc_healthy_schools_act_brochure.pdf

¹¹ Healthy Schools Act Legislation 4.

¹² Ibid. 2

integral components of public schools and public charter schools.”¹³ This includes creating garden facilities in schools that currently do not have them and maintaining and developing curriculum for those that do with the goal of using hands-on learning approaches to teach not only about healthy eating, but also about environmental stewardship. For the past year, I have served as a school garden intern at Harriet Tubman Elementary in the Columbia Heights neighborhood, and will use my participant observations to partially evaluate the successes and obstacles of the Farm to School Programs in D.C.

III. Successes

When attempting to measure the success of the D.C. Farm to School Network on improving food security and nutrition education, quantitative data alone illustrates many positive trends within the past two years. With regards to food security, after the HSA policies in conjunction with the Farm to School Network, DCPS and D.C. Public Charter Schools reported a 34% growth in school breakfast participation or 7,400 additional students eating breakfast at school in the 2011 school year.¹⁴ Beyond merely expanding access, school meal nutritional value was also successful, with 90% of schools serving lunches that meet the aforementioned HSA lunch criteria.¹⁵ And lastly, with regards to systems-level approach to food, in DCPS from September to December 2011, 35% of all produce served came from farms in the mid-Atlantic region, including apples, sweet potatoes, butternut squash and kale among other items.¹⁶

Clearly, these statistics illustrate huge leaps and bounds in food security and nutrition for school children in D.C. especially after the support of the HSA; however, there are more factors that influence the impact of farm to school programming than simply the implementation of a

¹³ Ibid. 12

¹⁴ DC Healthy Schools Act Snapshot (2012). D.C. Hunger Solutions. P. 1

¹⁵ Ibid 3

¹⁶ Healthy Schools Act of 2010 Annual Report (2012). Office of the State Superintendent of Education. Pp 1-37. P. 3

local policy. One contributing factor to the success of the D.C. Farm to School Network programming is strong institutional support within the D.C. government. The HSA created a position for a School Garden Specialist within OSSE who facilitates the creation and maintenance of school garden programs, trains educators, and creates coalitions with other community members and organizations.¹⁷ This strong institutional support within D.C. government for school garden programming is highly unique; D.C. is the only municipality with both a School Garden Specialist and a Farm to School Specialist [not funded through HSA].¹⁸ The current School Garden Specialist, Sam Ullery, hired by OSSE in June 2011, previously worked as a science teacher at Thurgood Marshall Academy Public Charter High School and established a school garden program and Green Club am.¹⁹ Thus, in addition to having institutional support, those that hold these positions are very well aware of the challenges faced by DCPS and D.C. Public Charter School teachers, students and faculty.

Another success of the Farm to School Network and its programming is that it has developed strong community coalitions and incorporated input from a diverse array of stakeholders. Specifically with school gardens, a School Garden Advisory Committee was established in 2011 as mandated by the HSA; within the advisory committee are 20 active members that serve one-year terms and come from a backgrounds ranging from non-profit co-founders, city government officials, teachers and students.²⁰ With such a broad range of experiences, professions and perspectives, this allows for the future of the DC School Gardens program to be as diverse and holistic as possible, building on the systems-level thinking already

¹⁷ Ibid

¹⁸ "Report on the Health, Wellness and Nutrition of Youth and Schools in the District of Columbia." (2012). <http://osse.dc.gov/sites/default/files/dc/sites/osse/service_content/attachments/HSA%20Commission%20FY12%20Report%20final.pdf>.

¹⁹ Healthy Schools Act of 2010 Annual Report (2012). Office of the State Superintendent of Education. Pp 1-37. P. 6

²⁰ Ibid

established by the HSA. Additionally, each of the 20 members participates on one of seven working groups that focus on one specific aspect of the School Gardens Program. The working groups include: funding, technical support, facilities, professional development, outreach, Green Ribbon Schools, and data collection.²¹ From my own personal experiences working as a school garden intern, I have had the opportunity to work and interact with a variety of different professionals in the development of the Tubman school garden, including technical experts from University of the District of Columbia and Capital City Farm Company. I have also worked with local non-profit City Blossoms to do field trips and collaborate on a grant to benefit the Tubman garden facilities.

Also contributing to the ongoing success of these programs is their sustained funding. HSA programs and policies are funded through a 6% sales tax on soda and other sweetened goods in Washington, D.C.²² Originally, HSA advocates pushed for a penny per ounce tax to be levied on soda manufacturers, however, due to intense lobbying by Coca Cola and PepsiCo, the sales tax approach was adopted instead.²³ The amount collected through the sales tax is about \$4.266 million per year.²⁴ This money is then deposited into a fund for HSA programs and is distributed by OSSE.²⁵ In addition to the funds administered through HSA programming, there are a number of competitive grants available through OSSE related to health and wellness programming in schools. Schools can complete grants to compete for funding up to \$10,000 for school garden programs and up to \$200,000 for physical activity grants each school year.²⁶ In the 2012 school year alone, 22 DCPS and D.C. Public Schools were awarded funds up to \$10,000

²¹ Ibid, 12

²² "History of Farm to School in D.C. Healthy Schools Act." <<http://dchealthyschools.org/hsa-resources>>.

²³ Ibid

²⁴ "Report on the Health, Wellness and Nutrition of Youth and Schools in the District of Columbia." (2012). <http://osse.dc.gov/sites/default/files/dc/sites/osse/service_content/attachments/HSA%20Commission%20FY12%20Report%20final.pdf>. P.6

²⁵ Ibid

²⁶ Ibid

for the OSSE School Garden Grant Program; the schools were in all eight wards and ranged from elementary to high schools.²⁷ Continued funding opportunities such as these allow for programs involving food security and nutritional education to continue to function in schools all over the city without placing the entire financial burden on schools or families of students.

Lastly, the success of the D.C. Farm to School Network programming has depended on the emphasis of professional development at all levels involved in food and nutrition in schools. The D.C. Farm to School Network has made it a priority to provide educational workshops and development programs, the most prominent being the School Garden 101 trainings through OSSE and the Growing Garden Teachers Program through local non-profit DC Greens. The Growing Garden Teachers Program was developed and implemented in 2010, with the goal of creating a professional network for garden educators and, “provid[ing] a forum for the sharing of best practices and peer support so essential to every educator.”²⁸ The program includes 11 monthly trainings and a two-day workshop where each interactive workshop focuses on a different aspect of the role of school garden coordinator.

With my position at Tubman Elementary I have participated in these workshops and topics have included engaging parents and local community, winterizing your school’s garden, and developing curriculum among other topics. The goal is to provide teachers with the skills to use school garden facilities effectively, to engage students and community members, recruit volunteers, and build support among teachers and faculty at the school.²⁹ Apart from fostering professional development for just garden coordinators, the D.C. Farm to School Network has committed itself to involving other key to developing health and wellness programs in schools,

²⁷ “OSSE Announces School Garden Grant Recipients.” (2012) Office of the State Superintendent of Education. <<http://osse.dc.gov/release/osse-announces-school-garden-grant-recipients-launches-spring-programming>>.

²⁸ “Growing Garden Teachers 2013.” DC Greens. <<http://dcgreens.org/ggt/>>.

²⁹ “First you grow the teachers.” (27 March 2013). *The Washington Post*.

in particular foodservice workers. In April of 2012, the D.C. Farm to School Network held a workshop for foodservice representatives from 60 DCPS and D.C. Public Charter Schools with the goal of, “[getting] students and cafeteria staff on board with the healthier, farm-fresh foods now being served in school meals.”³⁰ The D.C. Farm to School Network finds its strength in developing and valuing key allies in promoting nutrition education and food security. Most noteworthy is incorporating foodservice workers, who are often left out of school wellness policies and practice, which is an important step forward in enforcing and continuing these practices, as foodservice workers are at the frontline of food preparation.

IV. Obstacles

While the D.C. Farm to School Network has experienced many successes in their programming surrounding food security and nutritional education among DCPS and D.C. Public Charter School students, there still remain many obstacles in moving forward with these programs. One key issue is the distribution of school gardens and programming. While D.C. has over 80 active school gardens, they are not equally distributed over the city. In a study conducted by the School Garden Advisory Committee, they found that there are only six active school gardens in Ward 8, whereas in Ward 6 there are 16 active gardens.³¹ If these policies of health and wellness are truly to be citywide, then more outreach to schools in Ward 8 is critical.

Another obstacle facing the effective implementation of citywide health and wellness in schools is ensuring consistent messaging. Across the many schools and educators in D.C. it is extremely difficult to track and monitor exactly what is being taught and who has all available resource. Indeed, one of the biggest struggles still facing the implementation of this type of programming is developing a uniform curriculum relating to health and wellness. One example

³⁰ Healthy Schools Act of 2010 Annual Report (2012). Office of the State Superintendent of Education. Pp 1-37. P. 6

³¹ Ibid 20

of these problematic discrepancies was discovered in an annual report on health and wellness in schools by OSSE when they found that some schools were still teaching nutrition and food groups through the Food Pyramid instead of My Plate, now considered the most accurate tool for teaching food groups, portions and daily recommended values of foods.³² If programming surrounding nutrition education is truly to be equal and widespread across the city's students, it is essential for uniform messaging to be established and distributed to educators in a manner that is accessible.

In addition to the need to have uniform approaches to nutrition education, it is crucial to have a standardized approach to how educators introduce and encourage healthy eating habits and new foods. Very little research has been completed on reactions of DCPS and D.C. Public Charter School children to these changes in school meals and how much of each type of food they actually consume. It is critical to strike a balance between authoritarian and apathetic approaches when it comes to guiding children's meals as this has a huge impact on children's perceptions of new foods. Kristi King, a spokesperson with the Academy of Nutrition and Dietetics says, "Some studies have shown that when they were put in a situation where somebody is saying 'finish this' or 'finish that,' the kids actually had more negative responses and actually consumed *less* and the food than the kids who didn't have that reinforcement of 'you need to finish.'"³³ This will be the overarching challenge not just for the D.C. Farm to School Network, but also for nutrition educators across the country.

In a similar vein, the D.C. Farm to School Network faces the challenge of moving beyond

³² "Report on the Health, Wellness and Nutrition of Youth and Schools in the District of Columbia." (2012). <http://osse.dc.gov/sites/default/files/dc/sites/osse/service_content/attachments/HSA%20Commission%20FY12%20Report%20final.pdf>. P.9

³³ Patti Neighmond. (4 March 2013) "Selling Kids On Veggies When Rules Like 'Clean Your Plate' Fail. *National Public Radio*. <<http://www.npr.org/blogs/thesalt/2013/03/04/173275456/selling-kids-on-veggies-when-rules-like-clean-your-plate-fail>>.

a movement that focuses mainly on food security, as I argue that it does address, to one of food sovereignty. The International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) defines food sovereignty as: “The right of people and sovereign states to democratically determine their own agricultural and food policies.”³⁴ The current model of the D.C. Farm to School Network and HSA programming allows for little to no input from students on school meals. Furthermore, much of the rhetoric in public health spheres surrounding childhood obesity is framed in terms of placing blame and shame on children and their families. Indeed, author and scholar Julie Guthman writes: “Yet entirely absent from the pages of the recent popular books is any authorial reflection on how obesity talk further stigmatizes those who are fat, or on how this social scolding might work at cross-purposes to health and well-being.”³⁵ There is a need to move beyond a mere food security model to one of student empowerment – of students truly taking control of what is served in their schools instead of being subjects of health and wellness policies. School garden programs are a positive first step, however there should be more opportunities or forums for students to speak or be involved in other steps of the supply chain, such as purchasing, preparation and serving among others. There is a wealth of culture in many DCPS and D.C. Public Charter Schools that could and should be incorporated into school meal programs and could further contribute to a food sovereignty movement within the work of the D.C. Farm to School Network.

³⁴ “International Assessment of Agricultural Knowledge, Science and Technology for Development.” (2008). United Nations Environment Programme.
<http://www.unep.org/dewa/Assessments/Ecosystems/IAASTD/tabid/105853/Default.aspx/docs/Global_SDM_060608_English.htm>.

³⁵ Julie Guthman. (2008). “The Food Police: Why Michael Pollan makes me want to eat Cheetos.”
<<http://www.utne.com/2008-01-01/Politics/The-Food-Police.aspx>>.

V. Conclusion

In sum, the D.C. Farm to School Network has experienced admirable success in providing nutrition education and school meals to food insecure families in DCPS and D.C. Public Schools. Much of this success can be attributed to the D.C. Healthy Schools Act, which provided the legislative framework. However strong community coalitions, an emphasis on professional development, strong institutional support, and a sustained funding model for these types of programs has also had a marked effect on their impact. Yet, the D.C. Farm to School Network still faces many barriers moving forward, ranging from distribution of programming across the city to student input and participation. The issue of student participation and empowerment is the most crucial obstacle, as the D.C. Farm to School Network has the potential to move beyond a movement focusing on food security to one of food sovereignty. The need for DCPS and D.C. Public Charter School students to have an active role in determining their food choices is essential and could potentially be a frontrunner in shifting the rhetoric of the public health realm away from treating children and their families suffering from obesity or hunger as mere passive subjects into active participants in their lifestyle choices.

This is clearly a long-term shift, however the strong framework and legislative support is already in place making the potential for success very strong. I believe that a standardized curriculum with a focus on a food sovereignty angle, in addition to a stronger emphasis on place-based education could address these issues. This type of curriculum would aim to preserve localized culture of each student in the educational process of health and wellness. The next section of this project will be the actualization of this type of curriculum as I have crafted it, drawing on inspiration and lesson plans from other educators and my experiences teaching and co-facilitating at Harriet Tubman Elementary.

Soil to Supper, Plate to Planet: A Comprehensive Place-Based Garden Curriculum

After my analysis of the D.C. Farm to School Network and its efforts in addressing food insecurity and nutrition education and my personal work as a garden intern at Harriet Tubman Elementary I found that the best outlet to approach these issues is through the creation of a garden-based curriculum. My findings in my prior research and co-facilitation experiences show that current curricula focused on food and nutrition are often too-uniformed, and that a focus on place-based education would be highly beneficial. Scholar and educator David Greunewald writes: “Place-based pedagogies are needed to that the education of citizens might have some direct bearing on the well-being of the social and ecological places people actually inhabit.”³⁶ Critical place-based pedagogy lends itself extremely well to garden-based curricula as students can have a sensory and kinetic experience of their outside surroundings in an outdoor classroom.

The following curriculum is a collection of lessons adapted from other educators and resources, adapted to teach in the urban setting of Washington, D.C. and also slightly modified based on my experiences teaching in an outdoor classroom. The lessons are intended to be taught in order in a 1-2 week time span to 3-5th grade students and are intended to give a holistic overview of food systems. The five general themes are as follows: 1) soil; 2) parts of the plant; 3) seeds; 4) food choices; 5) environmental stewardship. Each lesson has a set of intended objectives and goals, background information, materials, preparation, discussion themes, and conclusions questions.

³⁶ David A. Gruenewald. (2003). “The Best of Both Worlds: A Critical Pedagogy of Place.” *Educational Researcher*, 32(4). Pp. 3-12.

Lesson 1: Soil Chefs³⁷

Objectives:

- identify and name key parts of soil
- discuss and understand importance of soil for plants
- develop critical observation skills

Background:

Soil is the foundation of food and agriculture systems, thus it is logical to start the curriculum detailing soil and its importance. A healthy soil is what will determine the health of the plants students grow later, and on a larger level determinative of ecological health. Soil is more than just dirt, it is a living, breathing organism with a complex composition. Key components include: air, water, organic matter, microorganisms and soil (comprised of clay, silt and sand – varying in particle size). We often take soil for granted, when in reality its formation is a very long process. “Every inch, 2.5 cm, of topsoil requires more than 100 years to form.”³⁸ Decomposers – such as worms and bacteria - and weathering assist this process.

Materials:

- large mixing bowl
- large spoon
- small amount of soil taken from garden
- small amount of water
- small amount of sand or gravel
- optional: chart detailing composition of soil

Lesson & questions for discussion:

- break up students into groups of 2-3
- explain that today they will be acting as “Soil Chefs”
- Discuss the question: “What is soil” – it’s more than just dirt!
- Brainstorm potential ingredients of soil
- Then, using chart, discuss the main “ingredients” to a healthy soil
- Why might healthy soil be important?
- Then, have each student group add in the “ingredients” (soil, gravel/sand, water, “air”) and take turns mixing
- Discuss if this soil looks like soil outside? Why or why not?
- What happens if an “ingredient” is missing from the soil?
- Then discuss, the last ingredient of healthy soil: time
- Discuss the role of decomposers → students have been playing the role of decomposers by mixing, however soil needs much more time to form.

Concluding questions:

- What are the main components of soil?
- Why is soil important?

³⁷ Adapted from Rooting D.C. Workshop, taught by Anna Benfield of the Washington Youth Garden on February 23, 2013 at Woodrow Wilson High School in Washington, D.C.

³⁸ Roberta Jaffe & Gary Appel. (2007). “Space Travelers” from *The Growing Classroom*. Life Lab Science Program. Pg. 81.

Lesson 2: Soil Types: Which Grows Best?³⁹

Objectives:

- Learn and understand the scientific method
 - o Develop a hypothesis and design an experiment
- Discover the effect of soil composition on plant growth

Background:

Soils vary in type and in composition: some soils contain a higher composition of sand, some are more compacted, and others are drier. While it is very difficult to test for all of these variables in one experiment, it is important to distinguish between different types of soils and understand that soil type has a strong impact on plant growth and health.

Materials:

- 4 small seedling pots
- radish seeds
- potting soil
- field soil
- sandy soil
- compost
- indoor growing light OR hospitable outdoor growing conditions
- journals / writing material for students

Lesson & questions for discussion:

- Ask students to review what they learned last lesson about soils
- Remind students that soil is the foundation for healthy plants and provides them with *nutrients*
- What are nutrients?
- How might different soils impact the growth and health of a radish plant?
- Ask if any students have heard of a hypothesis.
 - o Explain that it is a question that can be tested by an experiment
- Show students the 4 different soil types and explain: potting soil, field soil, sandy soil and compost
- Have each student make and record their hypothesis on which type of soil will produce the healthiest radish plant
- Then ask students how they would design an experiment to test their hypothesis
- Explain to students that they will be planting radish seeds in each of the different types of soils, but that the amount of water and sunlight will remain the same. Ask why they think this is.
- Teacher will monitor seedlings over the span of 2-3 weeks → students will continue to monitor plants and record progress.
- Afterwards, class will convene and discuss the results of their experiments and whether their hypotheses were correct and incorrect

³⁹ Dr. Robert Vaschak (2011). Veggie U: Earth to Table Curriculum. Pg. 31.

- As a follow up, have students compare each of the 4 types of soil to a soil sample taken from outside the school
 - What is the composition of your school's soil?
 - How is it similar to the samples? How is it different?
 - How would you describe it?
 -

Concluding questions:

- What is a hypothesis? How do we test it?
- How are soils different? How are they similar?

Lesson 3: What am I Eating – Stem, Root, Leaf or Fruit?⁴⁰

Objectives:

- Learn and identify the parts of a plant
- Understand that different food items are different parts of the plant
- Identify food items that students commonly eat

Background:

We often consume fruits and vegetables without considering which part of the plant they actually come from. Many common food items can be classified scientifically as plant seeds, roots, stems, leaves and fruits. In fact, many of the items we often call “vegetables,” scientifically are actually classified as fruits – the part of the plant that develops from the fertilized flower that contains seeds. Explaining and defining the parts of the plant as they are scientifically classified is key to understanding this activity.

Materials:

- samples of produce for each part of the plant (i.e. carrots, celery, spinach, broccoli, sunflower seeds).
- Journals or writing material to record observations

Lesson & questions for discussion:

- As a class stand up to do a kinesthetic activity to learn the parts of the plant
 - o Teacher will explain each part of the plant while doing a motion to symbolize the part of the plant he/she is explaining
- Afterwards, teacher will ask students to create a chart in their journal for the different parts of the plant: seed, root, stem, leaf, fruit.
- Then, independently or in small groups, the students will examine the different produce items and write down in their journals which category they belong in
- Discuss the answers and resolve any questions as a group
- Ask students to think of their favorite food, or a food their family eats on special occasions
 - o Which part of that meal comes from seeds? Roots? Leaves? Stems? Leaves? Fruits?
- As a class, can then eat the different produce

Concluding questions:

- What are the basic parts of a plant?
- Did any of the food classifications surprise you?
- Do you have a part of the plant that is your favorite to eat?

⁴⁰ Jaffe & Appel, Pg. 155.

Lesson 4: ZIP Code Seeds⁴¹

Objectives:

- Gain understanding of eating seasonally, climate, plant varieties
- Estimating quantities when ordering

Background:

School gardens / outdoor classrooms are a great way to illustrate the concept of seasonality – the fact that despite the seamlessly endless bounty in grocery stores, certain plants can only grow in a student’s neighborhood at certain times of the year. Furthermore, there is an entire wealth of varieties that never see grocery store shelves and that many have never heard of, but that might be native to the area of hundreds of years. Local seed catalogs provide a historical account of these varieties as well as a wealth of information on planting schedules as well as provide an outlet to support local farmers.

Materials:

- Seed catalogs (or website)
- (Optional): different varieties of tomatoes or carrots (depending on season) to illustrate concept of varieties to students

Lesson & questions for discussion:

- Ask students to discuss what they know about the 4 season
- Discuss that different plants “like” different seasons and will only grow during that time
- Ask what plants students have seen growing in gardens in their neighborhood
 - o Explain that some plants are suited for certain climates
 - o Has anyone ever seen a pineapple growing in D.C.? Why or why not?
- Illustrate / discuss what variety means in terms of plants
 - o Purple carrots, yellow tomatoes!
 - o Same fruit, different type
- Then, as a class (if seeds still need to be purchased for garden) discuss different criteria for seeds to buy for the class garden
 - o What is suitable for the climate? What does the class like to eat? What season are we planting in ?
- Based on this information, develop a chart and divide students into groups to find the information in seed catalogs
- Discuss findings as a group

Concluding questions:

- What did you find most interesting about the seed catalogs?
- Were any of the seed companies located close to D.C.?
- Why do you think there are so many varieties of the same plant?
- Do you think there are benefits to growing different types of varieties?

⁴¹ Jaffe & Appel, Pg. 122.

Lesson 5: Pollinators – The Plant Life Cycle & Our Food⁴²

Objectives:

- To understand what a pollinator does and what are some local pollinators
- Gain basic understanding of pollination and its place in the plant life cycle
- Understand how pollination and pollinator services affect humans' food supply

Background:

Pollinators expand beyond the basic “birds and bees” mentality, to many different organisms such as beetles, bats, butterflies and the wind. Different types of pollinators are attracted and suited to extract pollen from different types of flowers, each having a very different relationship. Pollination occurs when an insect or other organism extracts pollen from one flower and transfers it to another allowing for reproduction to occur. Without this critical service, many of the fruits and nuts humans consume would not exist; some estimate that one out of three food items humans consume are products of pollination by bees.⁴³

Materials:

- Chalkboard
- Paper
- Safety pins
- Markers

Lesson & questions for discussion:

- Ask students what they know about pollination
 - o Give a brief explanation
 - o Explain importance of pollination to food
 - Ask students to list their favorite fruits → these items are dependent upon pollination by honeybees
- What is a pollinator? Name some pollinators that you know
 - o Many more than just bees!
- Write the following list on the board:

Pollinator	Type of Preferred Flower
Beetle	White or dull
Honeybee	Bright flowers
Mosquito	Small flowers
Butterfly	Red, orange, blue or yellow flowers
Bat	Large, fragrant flowers
Hummingbird	Red flowers with no fragrance
Moth	White or yellow fragrant flowers
Wind	Small, colorless flowers & Grasses, corn

- Then, divide the class into two groups: flowers & pollinators
 - o Each student will be secretly assigned a role from above table by the teacher
- Students will then have to silently find their match

⁴² Jaffe & Appel, Pg. 235.

⁴³ Ibid.

- After this activity, students should go outside to observe pollinators in the school garden
 - o Which pollinators do you observe? Which plants do they go to? How long do they stay there?

Concluding questions:

- What kind of relationship do you see between the plant and the pollinator? Who benefits?
- What kind of pollinators have you observed in your neighborhood? What kind of flowers?
- What would happen if pollinators went away? Why are pollinators important?

Lesson 6: The Food I Eat⁴⁴

Objectives:

- Learn basic food groups, foods in each, and their contribution to our health
- Learn about serving sizes / portions
- Learn what a “balanced meal” means and learn to prepare one

Background:

Nutritionists and scientists have created a number of different tools and images to help guide consumers through portions of different food groups. Most recently, MyPlate was developed by the U.S. Department of Agriculture as a way to represent on one individual’s serving, the portion of each of the main food groups: grains, vegetables, fruit, dairy, protein, and fats & oils.

Materials:

- chalkboard
- cut outs of different foods from each food group
- copies of USDA MyPlate
- blank paper
- markers

Lesson & questions for discussion:

- Open up lesson with having each student share his/her favorite food with the class
- Why do we need food?
 - o Energy, health
- In order to get this we need a “balanced diet” → what do you think this is?
 - o What is a nutrient?
- Describe different food groups, what nutrients each contains, and what food items are in each group
- Write different food groups on the chalkboard
- Then, have students match each food item with its appropriate food group
- Then, present the MyPlate → ask students what they think this chart is used for
- What is a portion? Why is this information important?
- Go over USDA recommended portions of each food group
- Then, have each student design a balanced meal by USDA standards with their preferred foods
- Go over as a class

Concluding questions:

- Why do you think it is important to have a balanced diet?
- Why are portions important?
- Name your favorite foods in each food group.

⁴⁴ Vaschak, Pg. 66.

Lesson 7: Eat the Earth⁴⁵

Objectives:

- Learn and understand the concept of “ecosystem”
- Understand land scarcity and the importance of maintaining healthy soil
- Understanding human impacts on the earth

Background:

To bring the curriculum back full circle, this lesson emphasizes the importance of maintaining the resources that students have learned about due to their scarcity and importance to humans. Humans have already depleted much of the earth’s natural resources in a manner that is unsustainable in the long-term. The purpose of this activity is to visually illustrate this problem to students and get them thinking creatively about solutions.

Materials:

- 1 apple
- Knife

Lesson & questions for discussion:

- Brainstorm as a class some of the natural resources the earth provides us
 - o Draw on past lessons, especially soil, and ask students if they remember why these resources are important.
- Ask students to imagine that the apple represents the Earth
- How much of the earth’s surface do you think is water?
 - o Cut apple into quarters
- Only 1/4 of earth’s surface is land
 - o Cut this piece in half and explain that the remaining piece represents land that is suitable for humans to live (the other is too dry, mountainous, etc.)
- Then cut the remaining piece into fourths
 - o Just 1 of these pieces represents land that is suitable for farming (the others are too wet, cold, have cities or highways)
- From the small remaining piece, cut an even smaller piece – this represents the 3/100 of 1% of the earth’s surface that contains safe drinking water
- What do you think about these portions?
- What does it tell us about our natural resources? How do you feel about it?
- Discuss the quality of natural resources in your neighborhood
- Discuss / create an action plan of how to better preserve natural resources at home, at school, in D.C.

Concluding questions:

- What did you learn about natural resources that the earth provides?
- Who should be responsible for taking care of the earth’s resources?
- How could you make your action plan better?

⁴⁵ Jaffe & Appel, Pg. 215