

Puesta del Sol

School Garden Handbook



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Puesta del Sol School Garden Goals

1. Engaging all students, all grades (580 kids) in hands-on activities in the organic garden tied to their existing BSD science curriculum, including physical, earth, and life sciences.
2. Becoming a showcase within BSD and beyond for exemplary practices in school garden science integration, green school integration, art appreciation integration.
3. Providing evaluation metrics at end of the school year to PDS and BSD with regard to garden programs and measures.

Garden Committee

- School: Teachers Delia Villanueva, Miriam Lopez Kimball, Christine Colyer, and Principal Jonathan Shearer
- Parents: Kathryn Pizzo and Forrest Jammer- Volunteer Parent Coordinators & Sponsors (Luly Feliciano school year 2013/14, head of SITA)

Origins

The Puesta del Sol School Garden, or *Nuestro jardín escolar*, was constructed at the end of school year 13/14, over Father's Day weekend in June of 2014. Thanks to the incredible generosity of seven community business donors (Eaglemount Forest Products, Cedar Grove, Hendrikus Organics, John Deere Landscaping, SpeeWest Construction, Ballard Hardware, and Garlic Crush) who contributed nearly \$10,000 worth of high quality raw cedar lumber, organic soil, organic compost, hardware, PVC piping, and irrigation fittings. In addition, over 250 volunteer hours by 15 school families and friends of Puesta del Sol, and just under \$2000 seed money from Puesta del Sol's PTA through the Spanish Immersion through the Arts Committee.

Luly Feliciano initially worked directly with Adrienne Nestor, joined by Forrest Jammer and was approved for PTA budget through SITA and the VP of Ed Enhancement Laura Rossow at the time. Sra Nestor obtained approval from BSD facilities (Nancy Larsen) in spring of 2014 to create the garden. Principal Shearer and his family attended the actual construction of the raised beds over Father's Day weekend, as did Adrienne Nestor. Linda Rochlin stated in September 2014 that no building use form was needed because the garden is 100% outside the school building.

The resulting six (16' x 4' each) beautifully designed, rough-hewn cedar log raised beds were designed by parent volunteer and professional landscape architect Forrest Jammer. They give 16 square feet of planting space per classroom, for a total of nearly 400 square feet of completed and completely prepped garden space.

On the first day of school, the new school garden welcomed Puesta del Sol's students with an explosion of vegetables, berries, herbs, and 10-foot tall sun flowers planted in organic soil and tended to by volunteers and teachers throughout the summer. The response to the new and beautiful green space has been overwhelmingly positive by students, staff, families and even graduates. Our aim is to make the school garden a locus of hands-on science learning, a laboratory for Spanish language enrichment, and an essential part of our school's ecological mission for every student.

School Garden Plans

We are actively incorporating the school garden as an extension of the Bellevue School District FOSS science curriculum,¹ as well as following the Washington State School Garden Toolkit. Our goal is to involve every student in every classroom. This school wide (580 students) garden provides real-life learning experiences related to studying beneficial insects, worms, caterpillars, pollinators, soil, caterpillar and butterfly lifecycles, planting and cultivation, and even composting from the lunchroom food waste. We have mapped the standard BSD schedule for science curriculum for each grade into the garden planting, pollination, harvesting, and composting schedules. Included later in this document.

The gardens are the foundation for so many aspects that are covered in class currently; reinforcing the message with hands on experience brings the elements and understanding full circle. Helping students understand how food is grown, what it takes to maintain a healthy growing environment, growing food year round, and providing natural nutrients for the soil with various vegetation and compost from our own cafeteria. Full circle demonstration at this level will provide the seed in our students' minds to create new ideas that will grow and last a lifetime, benefiting all of us now and in the future

Timeframe

- Curriculum planning and design with curriculum leader and parent/teacher Garden Committee 10/1/14 through 1/15/15
- Curriculum integration and rollout 1/15/15 through 6/20/15
- Student Green Team meets at lunch 3 days per week, sorting food waste and composting appropriate materials into the garden compost bins. Students take turns rotating the bins, and work with the Garden Club at recess to spread the ready-compost into the raised beds.
- Weekly 2nd Recess Garden Club – voluntary student participation beginning 10-1-14 through 6-15-15
- Parents and teachers Garden Committee meeting to plan and maintain the garden –ongoing
- **(April 24 2015 update: All of the above is complete and ongoing!)**

¹ FOSS is a research-based science curriculum for grades K-8 developed at the Lawrence Hall of Science, University of California, Berkeley. FOSS is also an ongoing research project dedicated to improving the learning and teaching of science. The FOSS project began over 25 years ago during a time of growing concern that our nation was not providing young students with an adequate science education. The FOSS program materials are designed to meet the challenge of providing meaningful science education for all students in diverse American classrooms and to prepare them for life in the 21st century. Development of the FOSS program was, and continues to be, guided by advances in the understanding of how people think and learn.



Growing Food & Growing Minds

Puesta del Sol is excited to unveil Nuestro jardín escolar, a joint parent-staff-student school garden project which promises to bring plenty of flavor to classrooms this coming school year. *More school news...*

From the front page of the BSD405.org site for Puesta del Sol September, 2014:

Integration into Other School and PTA Programs

- **Art Appreciation-** Creating garden signs and logos with each classroom. Will be rotating photo frames around office and lunch room per Principal Shearer's request for garden art around school.
- **Art Class** – Classes go into garden to sketch, photograph, and write about the garden. Sidoinés class already completed amazing sunflower sketches that are being framed around school, and converted to digital images for BSD website.
- **Fifth Grade Project** – Planning to make garden stepping stones for each 5th grade class to place into garden as their gift to the school this year.
- **Green Team** – Compost bins in place and in use by the Green Team for lunch room composting/recycling back into garden as fertilizer. Free lunch room waste containers were obtained in October (2014) from the City of Bellevue for taking the lunch room waste to the garden bins. Green Team were trained on proper composting ratios and how to use the compost tumblers.
- **SITA** – Spanish speaking garden/farmers/chefs to come speak during library class time.

Funding and Operations

- **School year 2013/14** – 83% funding came from private donors and community businesses. 13% (\$2000) came from the PTA SITA program. **Total \$12,000** to create the garden and buy basic tools for kids and volunteers (gloves/shovels/cultivators/weeders/compost bins/plastic storage bins).
- **School year 2014/15** –
 - **A BSF grant was completed** and submitted by Delia Villanueva and Jonathan Shearer in September along with other BSD schools with gardens. \$1400 was granted for first year operations. As per BSF grant rules, an end of year report will be filed in June to BSF with garden metrics and analysis.
 - URL for BSF grant process is here:
<http://www.bellevueschoolsfoundation.org/SitePages/grantforms.aspx>
 - **PDS PTA grant-** \$2000 from the PTA for first year startup plants, tools, curriculum, storage box, etc.

- **Future years - Sustaining budget** will be requested for ongoing maintenance and operations of the garden estimated at \$1200 per year for plants, soils and composts, seeds, pollinators, curriculum materials, replacement tools, gloves, etc. More will be learned after this inaugural year however this is the estimate based on experience to date and research with other schools.
- **School Support & Involvement** – Principal Shearer, Delia V, and Miriam Lopez Kimball are the “executive” school sponsors of the garden and are 110% positively supporting the school garden and all plans exactly as listed in this document. The parent volunteer group meets with them twice a month, (more often during spring and fall planting and harvesting) and they communicate to the rest of the teachers and staff in staff meetings, daily announcements, and the internal teacher newsletter. All teachers have committed to using their plot as an outdoor learning lab for their classrooms, and to focus on the science curriculum, along with reading, writing, and art in the garden.
 - **Water** : We worked with BSD facilities to obtain a water key and spigot placement close to the garden to facilitate irrigation and hand watering of the gardens. The official water keys must be checked out from facilities annually.
- **Role and Responsibilities** – It is imperative to have at least one BSD staff person as “sponsor” and another person who is a volunteer to coordinate the operations, upkeep, and volunteer coordination of the school garden. The more parent and community volunteers, the better for everyone.

Line Items (post construction costs)

Item	Cost
Suncast Vertical Deck Box to store garden supplies, with lock and cable	\$350
Annual organic soil and compost amendments for six 16 x 4 raised beds (\$6 sf x 5 bags per bed, \$30 x 6 = \$180)	\$180
Fall and Spring seeds, bulbs and plant seedlings for each of 6 raised beds (\$3 per seed packet, \$5 per plant seedling. 10 seed packets per bed, 15 plants per bed. = (\$30 + \$75) x 6 = \$630, Bulbs- 12 Costco bags (2 per bed) = \$150	\$780
Blueberry bushes (4)	\$60
Tubtrugs for hauling garden materials and debris- one per grade (\$20 x 6 = \$120)	\$120
Trellis material, plant identifiers, twine, plant stakes	\$70
Worm Factory Tray Worm Bins- one set	\$100
Containers for fruit bushes (4 @ \$30 = \$120)	\$120
Garden curriculum extra books, printed materials- kidsgardening.com	\$70
Materials for garden signage for each classroom plot allocation	\$150

Total costs (first year of operations, does not include construction costs from last year)	\$2000
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Curriculum Integration Opportunities

This section is designed to be used as a “menu” of sorts for teachers to map their existing science curriculum into opportunities to use the School Garden as their outdoor learning lab and extension of their classroom. All lessons are tied to BSD curriculum standards, encourage inquiry-based learning, provide hands-on experiential learning, and guide the teacher towards the next generation science standards. Each lesson also provides an environmental stewardship learning opportunity.

Volunteers are available to help in any way the teachers would like, to ensure that the garden beds are ready and supplies are available when and how they need them.

FOSS Elementary Module Sequences

PHYSICAL SCIENCE		EARTH SCIENCE		LIFE SCIENCE	
MATTER	ENERGY AND CHANGE	DYNAMIC ATMOSPHERE	ROCKS AND LANDFORMS	STRUCTURE/ FUNCTION	COMPLEX SYSTEMS
6 ↑ K	Mixtures and Solutions	Motion, Force, and Models	Weather on Earth	Sun, Moon, and Planets	Living Systems
	Measuring Matter	Energy and Electromagnetism	Water	Soils, Rocks, and Landforms	Structures of Life
	Solids and Liquids	Balance and Motion	Air and Weather	Pebbles, Sand, and Silt	Plants and Animals
	Materials in Our World		Trees and Weather		Animals Two by Two

Science/Garden Connections- SPRING!

Suggested activities below are mapped to BSD/FOSS Science Curriculum

SPRING	K Animals 2x2	1st New Plants	2 nd Insects	3 rd Measurement	4 th Structures of Life	5 th Environments
1: Quick, Easy Activities	Dig a few holes in search for worms. Observe the worms and release. Observe interactions of earthworms with their surroundings. Release red worms in the garden beds at the end of the unit. <i>How do they interact with their</i>	Observe/take some of the strawberry plant runners and root them in the soil to create new plants (within a few weeks, you will have a new plant). Take a tour through the garden and look for insects “doing their jobs”. Identify the parts of plants growing in the garden.	Visit garden to observe structure, pattern, and behavior of insects. Observe/find evidence in the garden that an insect has come in contact with a plant, by discovering some munched leaf corners or finding small insect homes.	Measure the beds and calculate area, perimeter. Dig down and measure depth of soil. Measure soil temperature with a thermometer. Measure plant growth from week to week. Chart it.	Conduct a seed hunt by opening fresh fruit and locating the seeds. Describe and compare seed properties. Examine and sort a selection of seeds—bean, pea, sunflower, and corn. Observe what is currently in the garden and discuss its lifecycle and how	Observe plants growing in range of environments-garden beds versus under trees. Good soil versus hard clay soil, etc. Do math in the garden. Calculate soil temperature differences week by week. Calculate height of various plants growing and percentage change over a duration.

	<p><i>environment? Will they be there tomorrow?</i> Discuss needs of worms. Collect leaves and other plant debris from the garden to place in the worm's habitat.</p>	<p>Compare the development of different plants. Visit the garden. Discuss what plants need to survive in their environment.</p>	<p>Collect insects from the garden and set up a habitat to observe. This can include crickets, ants, ladybugs, etc. (release back to the garden at the end).</p> <p>Collect insects from the garden. Identify abdomen, thorax, and head. Release at the end.</p>		<p>it's changed over time. Empty the compost bins onto a tarp, and observe what structures of life live among the composting materials. Snails, worms, invisible bacteria and fungi. (Put it back in the bin or in the green yard waste container.)</p>	
2: Plan Ahead Activities	<p>Plant flowers or vegetables and observe how other insects and/or garden critters interact with the plants, the soil, etc. Health Extension: identifying food groups, healthy garden foods, voting on foods to grow, and promoting a healthier, balanced diet.</p>	<p>Plant fast growing vegetables from seed such as lettuce, spinach, snap peas, & radishes). Plant flower bulbs. Record the growth of roots and bulbs. Plant seeds in dirt pods. After observing sprouting and growth, plant the pods in the garden bed. Watch the plants grow!</p>	<p>Plant plants/flower that will attract butterflies. Watch for sightings of butterflies. Science Extension: Investigate why insects travel from plant to plant. <i>What are they looking for? Why are they attracted to flowers? What important role do they play in plant reproduction?</i></p>	<p>Plant seeds or transplants of flowers or vegetables. Weigh seeds. Observe and measure mass in grams. Organize information on a record sheet. Compare the results of several weighings of different seed types. Make sensory comparisons of temperature of the soil in different parts of the garden. Observe and measure temperature in degrees Celsius.</p>	<p>Sprout seeds in the classroom and then transplant to the garden. (green beans, potatoes, etc) Investigate seed dispersal mechanisms of plants. Walk on the trail in the woods and notice natural seed dispersal and plant shoots and sprouts. Grow plants hydroponically and observe the life cycle of a bean plant. Collect food grown and count and compare the # of seeds produced. Plant seeds directly in the garden soil.</p>	<p>Setup and observe bugs and beetles animal investigations in the garden. Which plants attract the largest number of bugs and beetles? Hypothesize why? Set up and monitor an experiment to determine the range of water tolerance for early growth of four kinds of plants: corn, pea, barley, and radish. Investigate how isopods and beetles respond to environmental factors such as water and light, and determine the environmental preferences. Use the garden and compost bins as sample environments.</p>

3: Ongoing Activities	Math Extension: Count # of plants planted, # of fruits or vegetables growing in your plot, etc. Graph # of veggies growing. Other Science Extension: Draw a diagram of a plant growing in your plot. Label and write to explain. Manage a worm bin and feed the worms.	Vote for the class' favorite brassica plant (kale, broccoli, etc.). Plant it, watch it grow, and harvest and eat as a class! Go outside and record (picture) the growth of a class plant at various stages. Plant the same plant in a pot in the classroom and one in the garden. Compare the growth of both in different environments. Discuss water, nutrients, light, and air.	Writing Extension: Begin a science journal with garden observations of different insects. Including a picture and description of the insect and how it was interacting with its environment. Math Extension: graph # of insects sighted during each garden visit.	Visit the garden regularly to record changes in germination and growth. Record the tallest plant in the garden week by week along with the temperature. Make a growth chart and predict which plant will "win"! Language Extensions: Write stories about plants from extreme temperature climates. Read labels on plant seeds and discuss the "how to plant" differences.	Investigate the roots and shoots of various plants. Art extension: Make seed art. Math extension: Estimate the mass of various seeds. Compare seeds and flowers/fruits of vegetables to those of fruit trees and bushes. Observe and sort seedlings by properties of germination. Observe changes over time. Record information systematically for later analysis	Language Extension: Write natural history of beetles and isopods. Art Extension: Draw beetles and isopods. Science Extensions: Make a terrarium of local organisms. Investigate beetle metamorphosis. Keep journals of plant growth.
Anyone! Anytime!	Walk around and observe the garden changes week by week. Sketch drawings in the garden. Write descriptive narratives of how the garden looks, changes, etc. Measure the perimeter & area of the beds. Have kids get a book and just sit on the edges of the beds and just read in the sun as an outdoor classroom. Smell the various herbs and flowers and talk about them.					

Further, we are integrating Puesta del Sol's existing Green Team student club with the Garden Club (at 2nd recess every week) for the full lifecycle of food waste from the cafeteria to garden fertilizer to new plant growth. We have two tumbling compost bins near the lunchroom where all students can participate in the process of composting. Students will gain specific earth science knowledge from these processes, while at the same time, boost Puesta del Sol in the BSD Green Genius Cafeteria program by significantly reducing trash volume produced in the cafeteria.

(Puesta del Sol is already a Bellevue School District Green School highest achiever, level 3 of the Green Schools Program <http://your.kingcounty.gov/solidwaste/greenschools/puesta-del-sol-elementary.asp>.)

Our preparation is multi-pronged, and includes both curricular and extra-curricular activities:

- 1) In conjunction with the Puesta del Sol curriculum leader and garden committee (parents and teachers) to plan and include science-curriculum specific activities for each grade level. As described earlier, the school garden serves as the 'outdoor experience' direct extension of the Foss Science pedagogy. The garden will offer teachers and students a "living lab" steps from their classroom, where kinesthetic and experiential learning solidify what is learned inside at the students' desks. Our goals include promoting ongoing long term learning where students and teachers continue to take on any learning opportunities that naturally arise.
- 2) We will begin with a weekly Garden Club of students who meet at 2nd recess and are led through informal hands-on experiences with a parent volunteer in the garden. This is for all grades K-5 to have weekly (voluntary) experiences in the garden, and the ability to participate in seasonal garden chores. Being out in the garden will build excitement and interest in growing organic fruits and vegetables among students.

Plot Allocation for Teachers' Beds

Each teacher in every grade has allocated to them 16 square feet of raised bed space to use as they wish. There are wooden signs in place marking which grade

Student Outcomes

Most students in the Bellevue School District have never seen the full circle of food production, or a garden, or some-even a seed. Through our school garden, students will get physical hands-on experience planting seeds, transplanting live plants, fertilizing with organic compost, harvesting the fruits of their labor, and eating the fresh fruits and vegetables that they have grown. School gardens provide a context for multidisciplinary learning, ranging from nutrition and science to social, studies, math and language arts. Students benefit by expanding their palates, taste-testing healthy foods, and learning about food origins; engaging in authentic science field investigations; manipulating the environment to understand math in real-life applications; recreating historical activities; and writing across all these disciplines.

The further development of this garden project will specifically enhance science learning in multiple ways. We are directly aligning our learning lab with the BSD science curriculum by grade, following <http://www.fossweb.com/foss-modules>. In kindergarten, for example, students learn about earthworms and their habitat. They observe interactions of animals with their surroundings. What better way than to observe and learn about earthworms in their natural habitat! In first grade, students have a unit on plant rooting and will be able to apply new learning to rooting strawberries. Strawberry plants produce runners which can be rooted to create new plants. In second grade, students study metamorphosis of several insects including caterpillars. In the intermediate grades, students will have a chance to further explore ecosystems and organisms in terms of their interacting parts (third grade –water and surface adhesion; fourth grade- soil composition and Ph; fifth grade-more complex systems experiments) , in directly alignment with the progression of core concepts as the Foss conceptual models describe.

Additionally, the first week of October 2014, we started a weekly Garden Club of students who meet at 2nd recess and are led through informal hands-on experiences with a parent volunteer in the garden. This is for all grades K-5 to have weekly (voluntary) experiences in the garden, and the ability to participate in seasonal garden chores. Being out in the garden will build excitement and interest in growing organic fruits and vegetables among students.

Metrics & Evaluation

We are leveraging the Washington State Farm to School toolkit (<http://www.wafarmtoschool.org/Page/6/school-gardens>) and the success measures they recommend for elementary school gardens.

We are also using the Farm to School Garden Evaluation Toolkit and training series that are produced by the Colorado Farm to School Task Force in partnership with Spark Policy Institute, which is funded by a USDA Farm to School grant.

The evaluation framework will be part of the curriculum development this fall. We know that some initial baseline metrics will include:

Quantitatively:

1. Frequency and number of students per grade hands-on in the garden.
2. Quantity of science modules in Foss Science using the garden as their outdoor experience.
3. How many teachers using the garden, both during class and in their own time.

Qualitatively:

1. Faculty assessments and surveys on how the garden has contributed to their classroom enrichment and experiential learnings.
2. Student interviews on their garden involvement and attitudes throughout the school year.

Community Resources

Our Top 3 Internet Resources for School and Kids' Gardens

1. Washington State Farm to School toolkit (<http://www.wafarmtoschool.org/Page/6/school-gardens>)
2. www.kidsgardening.org – excellent resources, lessons, books and supplies
3. WSU Extension Master Gardener program kids' gardening resources <http://www.mgfk.org/resources/kid-gardening>

Grant Opportunities

There are many grant opportunities available to help fund the creation and operations of school gardens. For Bellevue schools, BSF is the primary place to start. For ongoing operations, networking and community connections are imperative. The following is a potential list to explore and there are many more

1. Bellevue Schools Foundation
2. Whole Foods
3. PCC
4. Cedar Grove
5. Republic Services
6. Seattle Tilth
7. Local nurseries, big box stores, landscapers, growers.
8. Many businesses at the links listed above under Internet Resources

Bellevue Botanical Gardens

Living Lab Classes at the Bellevue Botanical Garden

<http://www.bellevuebotanical.org/lab.html> All activities have been developed to align with Washington State Science Standards (EALRS) and Grade Level Expectations (GLE), as well as Bellevue School District Science curricula. We will be working to align them with Common Core. If you want to know more, please email: livinglab@bellevuebotanical.org.

Seattle Tilth

<http://www.seattletilth.org/> and specifically the children's gardening classes at the Pickering Barn in Issaquah