

Trifecta Ecosystems

Aquaponics: The Next Generation Classroom Computer

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A woman with long brown hair, wearing a blue and orange plaid shirt and blue gloves, is working on a hydroponic system. She is using a long-handled tool to tend to plants in a white channel. The system is filled with various leafy greens, including red-leafed varieties in the foreground and darker green ones in the background. The setup is indoors, with windows visible in the background.

With our mission to cultivate the City
that Feeds Itself™, we're creating
incentives for communities to grow
their own food while raising
awareness about sustainable farming
through education, workshops, and
city projects.





How Computers Revolutionized Learning

Before the desktop computer made it's way into the classroom you needed a myriad of tools to teach various subjects.

Computers brought a common and shared learning experience across STEM subjects and more.

K-12 Integration of computers created generational literacy in a new medium and tool.

Advanced Learning, Advanced Classroom Culture, Advanced Career Readiness

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Approachable, Scalable, Endlessly Engaging

Computers are a unique learning tool.

They are approachable by kindergartners.

It's a learning tool, that scales with the student, and can be used throughout their educational career as they explore subjects with more complexity.

Whether you are learning your ABCs and how to type, or designing a building with CAD software, computers enable the learning process and engage students to the subject matter no matter their learning level.

Computers in the classroom created generations of technology literacy.





STEM Education and NGSS: The Future of Learning in the Classroom.

- STEM Education Defined
- Why STEM Education Is Critical
 - Critical Thinking
 - Problem Solving
 - Innovation
- STEM Education and Career Readiness
 - Workforce Development
 - Advanced Career Readiness

NGSS: The Next Generation Science Standards

1

Crosscutting Concepts - Students explore connections across the four domains of Physical Science, Life Science, Earth and Space Science, and Engineering Design.

2

Science and Engineering Practices - What scientists do to investigate the natural world and what engineers do to design and build systems. Students engage in practices to build, deepen, and apply their knowledge of core ideas and crosscutting concepts.

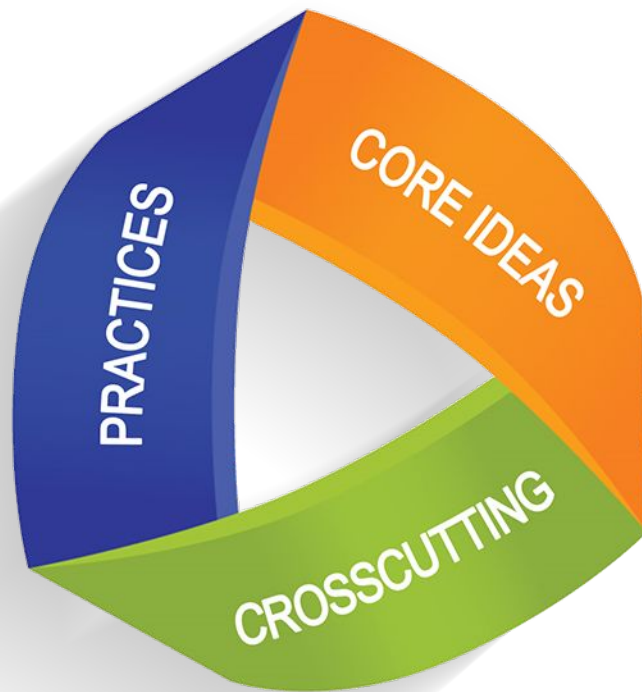
3

Disciplinary Core Ideas - The key ideas in science that have broad importance within or across multiple science or engineering disciplines. These core ideas build on each other as students progress through grade levels and are grouped into the following four domains: Physical Science, Life Science, Earth and Space Science, and Engineering.



How STEM and NGSS Are Reshaping Classrooms

- High Demand for interdisciplinary curriculum.
- High Demand for interactive, hands on learning tools
- High Demand to redesign classroom learning experience, especially in sparking interest and competency in science subject areas.
- Every state, every district, every school has to implement these changes over the next three years.
- Teachers, administrators, and district leaders are looking for easy, impactful solutions for their classrooms.





Aquaponics: The Next Generation Classroom Computer

With all these changes ahead, particularly in science classrooms, how can we as aquaponics practitioners offer solutions that educators desperately need?

Classroom aquaponics has the opportunity to become as transformational to the learning experience as the computer did a few generations ago.

An approachable, scalable, engaging, multi-disciplinary learning tool.

Aquaponics for STEM Learning

1

Science - Aquaponics and science go hand in hand. It's an ecosystem in a box. It provides a foundational, hands on learning tool for all life and environmental science, chemistry and physics. Simple enough for kindergarten, complex enough for high schoolers.

2

Technology - From LowFi to HiFi aquaponics uses a myriad of technologies. From LED lighting, smart sensor technology, arduino boards, HVAC and various modern growing methods.

3

Engineering - Engineering an ecosystem and engineering the infrastructure for that ecosystem is no simple task. From small desktop systems to commercial scale systems

4

Math - Whether it be through the observation of plant growth, charting and mapping trends, or data analytics there is a surprising amount of math that goes into growing plants in a scientific and academic setting.



Aquaponics and the Next Generation Science Standards

1

Cross-Cutting Concepts - Just like the computer originally, the aquaponics system lends itself to the facilitation of learning across all disciplines. It's particularly suited for the NGSS focus in Physical Science, Life Science, Earth and Space Science, and Engineering Design.

2

Science and Engineering Practices - The NGSS goal here is for students to investigate the natural world and use that to engineer design and build systems. It's cross cutting concepts in action and Aquaponics is uniquely suitable for this goal.

3

Disciplinary Core Ideas - Physical Science, Life Science, Earth and Space Science, and Engineering. These are the core ideas students will be focussing on in their k-12 learning.

Aquaponics provides a unique learning tool that can with the student as their education careers mature.

Aquaponics is approachable in adolescence yet complex enough for College Level Learning.

Systems and lessons can scale with the student and provide a common frame of reference for the student to use for hands on, engaging learning in the classroom.





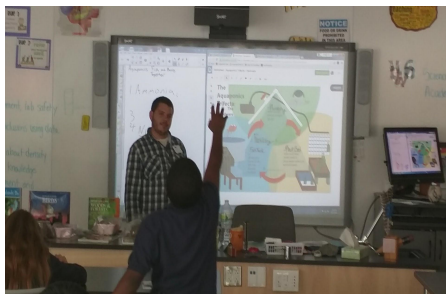
Aquaponics in the Classroom

With the whole nation focussed on increasing STEM education and implementing NGSS in all science classrooms educators, administrators and districts are clamoring for innovative learning tools and curricula that set them apart and offer an engaging, practical and proven solution for their teachers and students.

Aquaponics as a classroom learning tool can utilized by just about any subject, so it's something the whole school and staff can benefit from. Yet it hits the needs of STEM and particularly science teachers in a way no other learning tol can hope to achieve.

Aquaponics, like the computer, can revolutionize the classroom and create a Whole generation of students literate in growing their own food!

Aquaponics Classroom Case Studies



With Aquaponics Learning can be fun! These 1st graders had a blast coming up with names for their koi fish.



Aquaponics is exciting and engaging. The students can't wait to learn more, get involved and learn how to grow their own food!

Fish Names

THE BUBBA TWINS = the two dark orange fish that look the same.

JUNIOR = the other dark orange fish, but smaller.

PRINCESS DIANA = the white fish with purple coloring on the forehead.

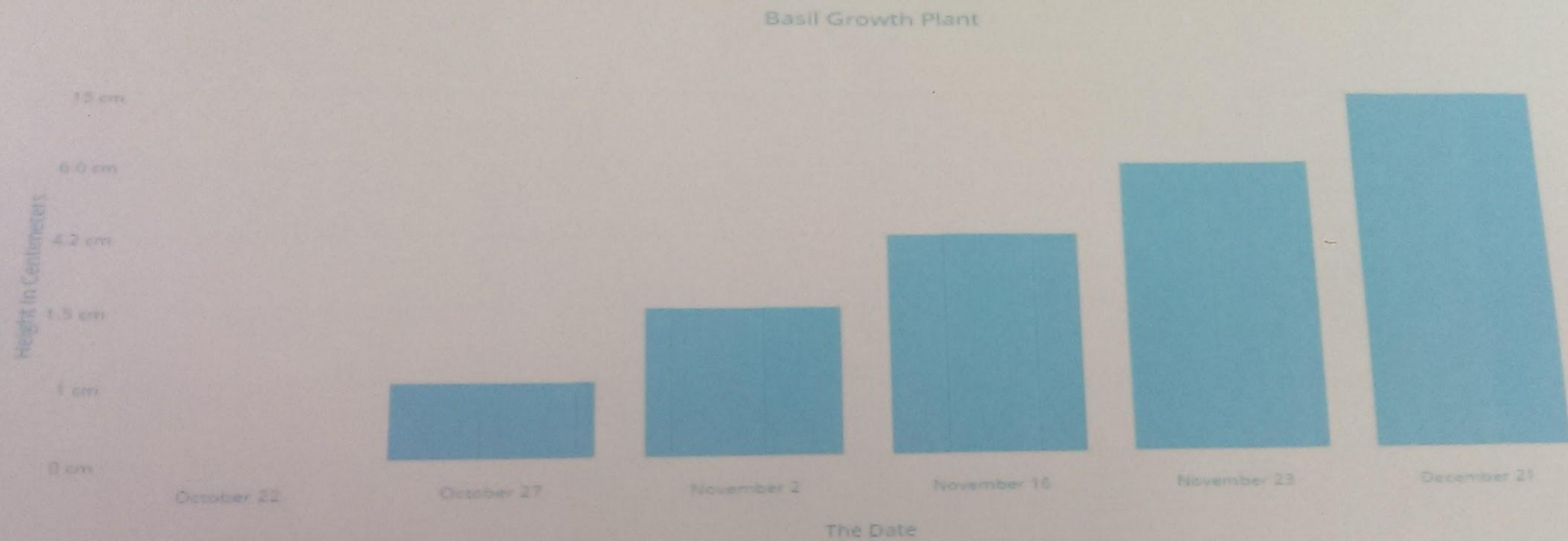
MAD MAX = the orange fish with the black Mohawk stripe.

WHITEY = the small white fish.

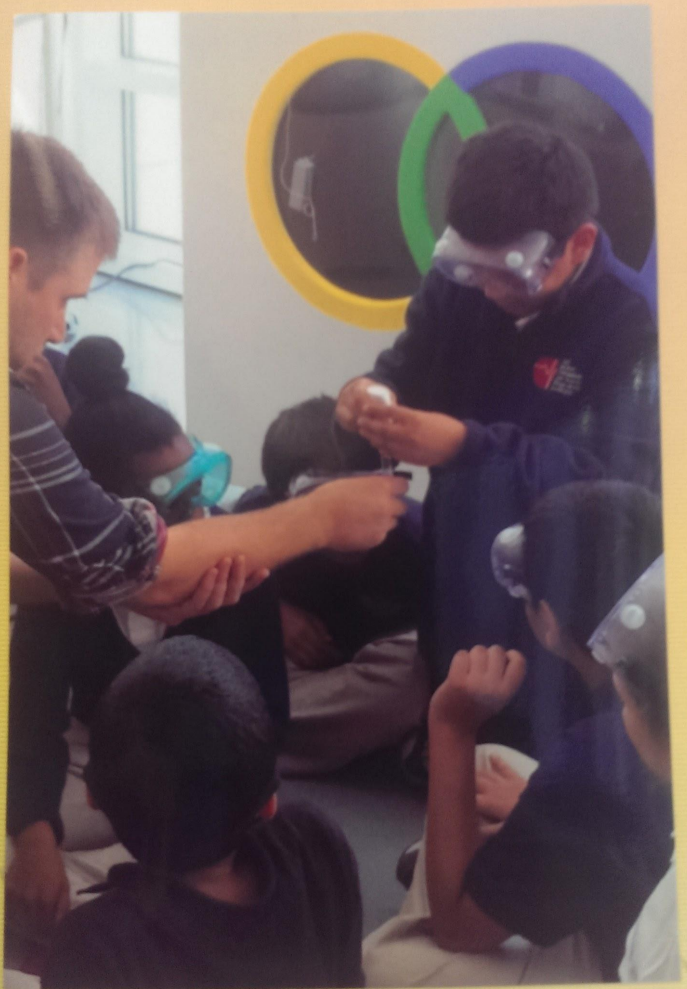
SPECK = the multicolored fish.

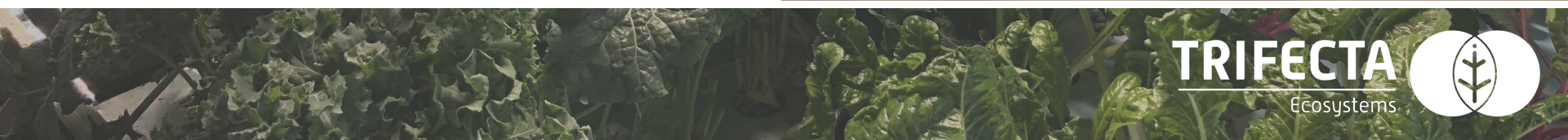
LENNIE = the smallest fish.

Aquaponics in the classroom creates a rewarding learning experience for kids as they literally get to eat the fruits of their labor.



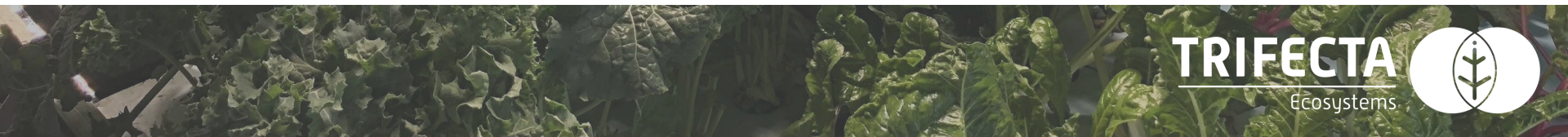
This is showing how much my plants grew over the months. I learned that it takes a while for plants to grow, I also know now that it takes math and techniques to grow plants. I learned that taking care of plants is pretty hard when you don't have teacher to help you.





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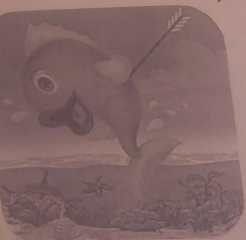
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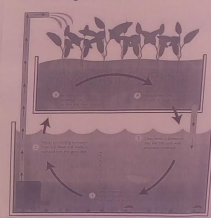
AQUAPONICS

What is it?

Refers to system that combines conventional aquaculture "raising aquatic animal such as snails, fish, and even plants!!



THE AQUAPONICS CYCLE



Why does it Matter?

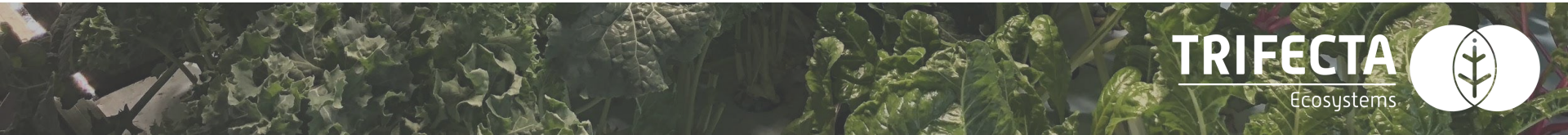
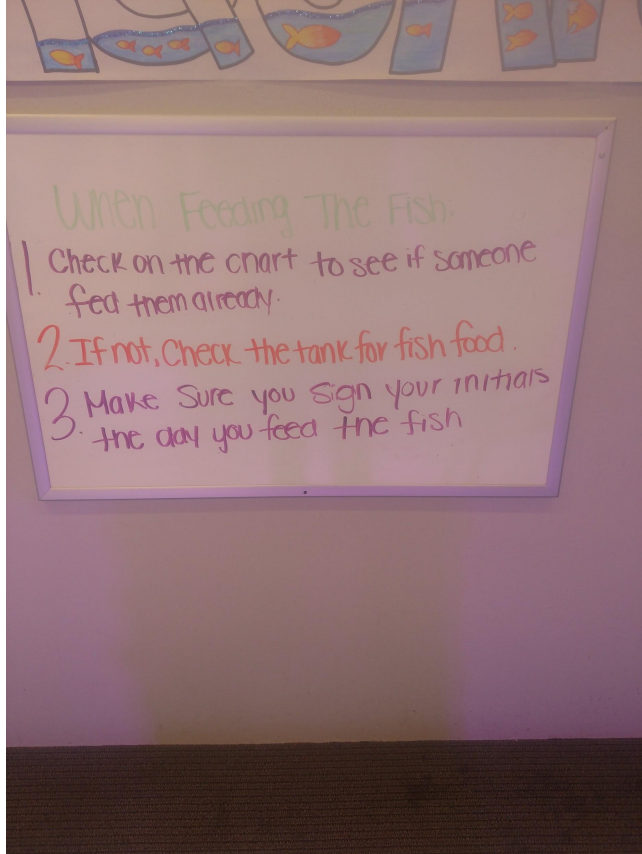
- Recycles the water in the system
- Can grow in droughts (useful)
- Plant grow twice as fast

Fun Fact

Nutrients from fish waste (PoP) feed the plants

When Feeding The Fish:

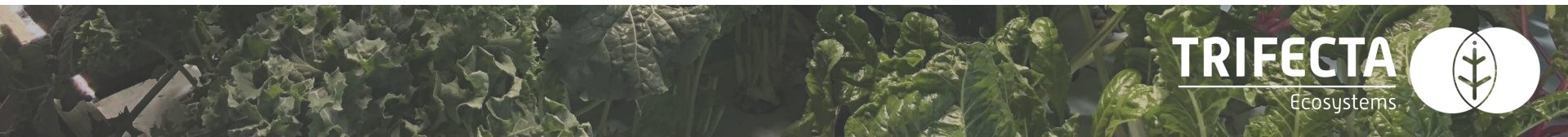
1. Check on the chart to see if someone fed them already.
2. If not, Check the tank for fish food.
3. Make Sure you sign your initials the day you feed the fish



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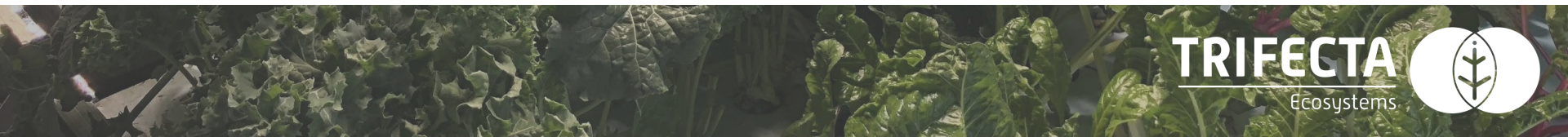
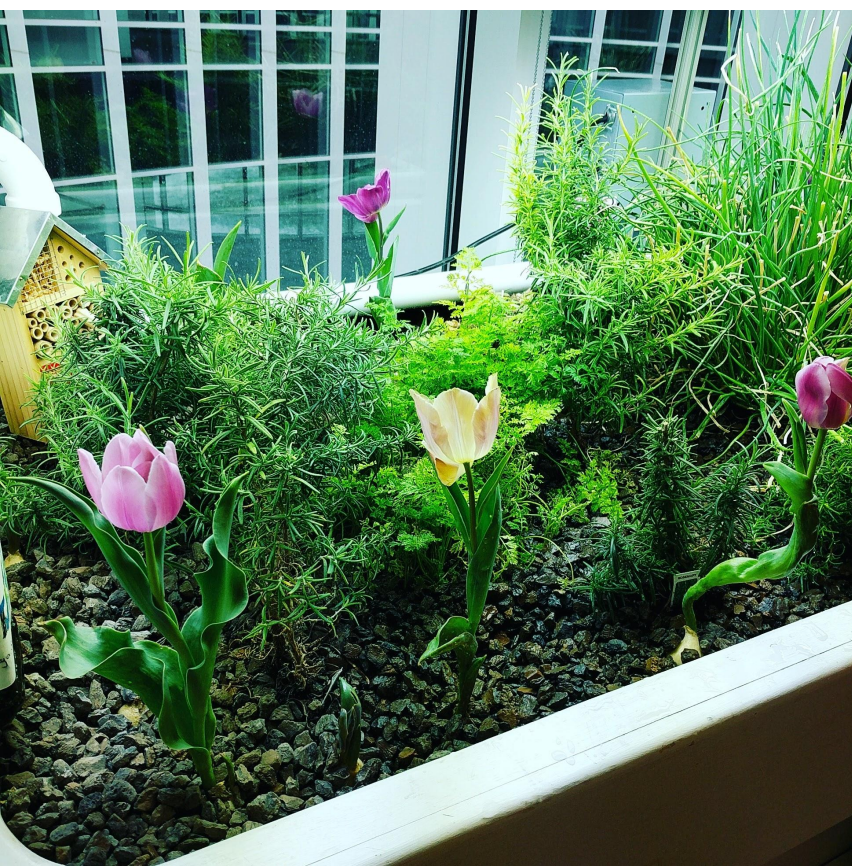
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Thank You!



Questions?
Comments

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