“Lawn Boy Combined with Aquaponics Inspires Our Entrepreneurial Spirit”

~ A Returning Developer ~

For further information contact…

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2018 - 2019 IDEA CATALOG OF EXCELLENCE

PROGRAM OVERVIEW

3rd, 4th and 5th grade students learned the symbiotic relationship between fish waste fertilizing herbs, while the herbs’ roots filter the water for the fish in this hands on aquaculture. Students read *Lawn Boy* where the main character is a boy, age 12, who through an incredible trail of circumstances turns the gift of a used lawnmower into a multi-million dollar success. These lessons combined the taste of an entrepreneurial future success and a potential for greener living. This book is an AR level 4.3 but offers a fresh perspective on the real world subjects of income, business opportunities, and financial growth.

The aquaponics system appears at first to be a simple fish tank, but when herbs grow abundantly out of the top, it is an engaging scientific wonder. Students harvest, weigh, and track the herbs that are grown in our aquaponics system and determine their market value.

Additionally, students study the nutritional aspect of growing our own organic food. Students follow a pencast, teaching the function of the parts of a flowering plant and how these plants reproduce. Next, they dissect a flower, attach parts to a lab sheet and label them. Students will follow a webquest to learn about aquaculture. We have an extensive garden, both traditional and hydroponics, but this aquaponics system demonstrates to all students this unique concept. It is placed in the library for all to view and read the informational posters. Students create lessons to inform their peers about the benefits of raising fish and growing produce with this innovative process. Students can film short video clips detailing parts of the process to be shared with the school via the news show.

Combining financial literacy, learned through reading Lawn Boy and other resources, with the idea of aquaculture farming to create a profit has sparked the entrepreneurial thought processes in my students. The Federal Reserve is a helpful resource, as they offer engaging free workbooks in which students can simulate a career choice, the required schooling (thus student debt), and lifestyle choices – rent/buy, economy car/ expensive car. They also learn basic budgeting and saving strategies.

OVERALL VALUE

Students at our school have very little financial vocabulary knowledge or understanding of business function. Our school has an extensive hydroponic and traditional school garden, but the aquaponics system inspires a different way of thinking about agri and aquaculture. All 435 students in the school are exposed to the aquaponics farm housed in the library. Additionally, gifted students and the 4th grade classes learned economic concepts that will benefit them in life. Some students managed a mock $100,000 portfolio, made trades, and tracked their progress in the stock market. Students learned about flowering plant reproduction and fish habitats. Students are enthused about the idea of a child being able to earn money; potentially this will encourage them to focus on a career path and understand the importance of education connected to supporting that path.

LESSON PLAN TITLES

- Lawn Boy
- Aquaculture - Is it the Future of Farming?
- Aquarium Webquest & Plant Reproduction

MATERIALS

See individual lesson plans.
ABOUT THE DEVELOPER

Mrs. Kuhlman is the Teacher of the Gifted at Highland City Elementary; she has also taught kindergarten, 1st grade, and 5th grade science at Stephens Elementary.

She graduated Summa cum laude from Warner University with a Bachelor’s in Business Management and obtained an Engineering and Technology in Advanced Manufacturing degree from Polk State Corporate College.

She participated in the district’s Alternative Certification in Education 3 year program to become a certified teacher and completed multiple courses in Gifted Education to be certified to teach Alpha students.

She has received multiple grants that have funded a variety of opportunities for all students at her school: aquaponics, hydroponics, raised bed gardening, and vertical planters that surround an outdoor classroom, Tivitz, the Tampa Bay Lightning STEM program, and financial literacy initiatives. She is passionate about teaching students real world connections and tries to instill in them a love for learning.

She was chosen by the National Science Foundation as one of 10 teachers in the U.S. to do 6 weeks of scientific research at the National MagLab for summer, 2016. She has been awarded both Adapter Grants and multiple Developer Grants.

★★★
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Lesson Plan No 1: LAWN BOY

■ SUBJECTS COVERED
ELA, Entrepreneurial Endeavors, Economics

■ GRADES
Three - Five (4.3 AR level book)

■ OBJECTIVES
The student will read Lawn Boy, analyze chapter titles, track character development, answer discussion questions, and choose one classroom connection to complete.

■ STANDARDS
FSS / NGSS
RL.5.1
Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

RL.5.6
Describe how a narrator’s or speaker's point of view influences how events are described.

RF.5.4
Read with sufficient accuracy and fluency to support comprehension.

W.5.3
Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.

W.5.4
Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.

■ MATERIALS
- Lawn Boy paperbacks
- paper
- pencil

■ VOCABULARY
- principles of economic expansion
- growth of capitalism
- the law of increasing product demand versus flat production capacity
- labor acquisition
- production expansion
- portfolio diversification
- overutilization of labor
- conflict resolution
- economic policy
- the art of creative misrepresentation
- team management
- serendipitous

■ AUTHOR’S BIOGRAPHY
Gary Paulsen carries books, his laptop, paper, and pens with him wherever he goes. He traveled with a carnival as a teenager and is a former dogsledder. The recipient of the prestigious Margaret A. Edwards Award in 1997, Paulsen is the author of several Newbery Honor books and is one of the most prolific and beloved writers of books for young people today.

■ CHAPTER TITLE ANALYSIS
For each chapter, write the connection of the chapter title to the events of the story and the meaning of the words. Use specific examples from the text!

■ DISCUSSION QUESTIONS
1. What is the best birthday gift you have ever received? How might you use it to start your own small business like the Lawn Boy did?
2. What do you think a good name for the Lawn Boy would be? Why? Can you think of another book (or TV show, or movie) where readers (or viewers) don’t know the character’s name? Why do you think Gary Paulsen chose not to give his book’s narrator and hero a name?
3. There’s a famous song by the Beatles called “Can’t Buy Me Love.” The lyrics say, “I don’t care too much for money, ’cause money can’t buy me love.” Do you think the Lawn Boy would agree or disagree with this sentiment? Why? Do you agree or disagree with it? Why?
4. Do you think the Lawn Boy will keep mowing lawns for the rest of his life? Why or why not?

■ SUMMARY
A twelve-year-old boy has no idea what’s in store for him when his grandmother gives him a used lawnmower for his birthday. What starts as a simple plan to mow lawns for cash, quickly unfolds into success beyond all expectations. Readers will follow this young entrepreneur through his exciting encounters with a stockbroker, a prizefighter, and more cash than he can count during the wildest and wealthiest summer of his life.
CLASSROOM CONNECTIONS

This book lends itself to a number of classroom connections in a variety of subjects, including science, language arts, math, art, drama, and music:

Science:

A lawn mower is a simple machine. This lesson plan about simple machines includes information and several simple experiments: http://www.tryengineering.org/lesson_detail.php?lesson=22. It includes links to teacher resource documents and student worksheets.

• This lesson plan, “In Class with Grass,” is designed to teach kids about grass: http://www.kidsgardening.com/Dig/DigDetail.ta?ID=1998&Type=Art.

• This site gives a scientific explanation of “how grass works”: http://home.howstuffworks.com/grass.htm.

Language Arts:

• Have students write a paragraph or short essay on how they think the Lawn Boy’s life will unfold after the book ends. What will become of him, Arnold, and Joey Powdermilk? If Gary Paulsen were to write a sequel to this book – or if they could write the sequel – what would the students want it to be about? What would they like to see happen as the story continues?

Math:

• This site has numerous games related to money and investments that would be appropriate for math, including games involving different types of currency and computing: http://www.younginvestor.com/kids/playIt/. (Most of these are printable worksheets; shockwave is required for some games.) Write an essay or create a PPT demonstrating what you learned.

• This is a Stock Market game that teaches students about investing and other business concepts: http://www.smgww.org/. Includes resources for teachers and might also fit into curricula other than math. <We did this as an entire class project, so I eliminated it from their choice menu.>

Art:

• This is an article about painting race car flames on a lawn mower: http://www.diylife.com/2007/12/07/paint-race-car-flames-on-your-lawnmower/. Students can sketch or paint their own lawn mower designs -- either how they think the boy in the book would personalize his lawn mower or how they would personalize their own. Design a piece of equipment and write an essay on how you would incorporate it into a business and how the graphics would impact your business.

• Grass plays a major role in the book. Here’s an art activity in which students paint empty eggshells to look like faces and plant grass as their hair: http://www.educationworld.com/a_lesson/02/lp259-02.shtml. Faces can be painted to look like different characters in the book. Write a summary of each character’s development.

Drama:

• This is a reader’s theater adaptation of Lawn Boy: http://www.txla.org/groups/tbA/docs/readers/Lawn%20Boy.doc. It’s a seven-minute skit with parts for nine different readers and is based on the opening pages of the book.

Music:

• This is a list of economics songs: http://www.kidseconposters.com/econsongs.html. Lyrics are provided, along with suggested tunes of familiar songs to use when singing these songs. Write your own lyrics for a song about Lawn Boy or additional economic concepts.

ACCOMMODATIONS

Students can pair up for classroom connections, students can partner read and analyze chapter titles in pairs

EVALUATION/ASSESSMENT

AR test for comprehension quiz #115808

Self-analysis of classroom Connection - Also see attached rubric

★★★

2018 - 2019 IDEA CATALOG OF EXCELLENCE
“Lawn Boy Combined with Aquaponics Inspires Our Entrepreneurial Spirit”
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Lesson Plan No 2: Is it the Future of Farming?

■ SUBJECTS COVERED
Science, Technology, Engineering, Math, Research

■ GRADES
Three - Five

■ OBJECTIVES
The student will study history and impact of aquaculture and engineer a design for an aquaponics system for our school (including cost analysis).

■ STANDARDS
FSS / NGSS
LAFS.6.W.3.7
Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate

LAFS.6.W.3.8
Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliography

LAFS.1112.W.2.6
Use technology, including the internet, to produce and publish writing

LAFS.7.SL2.5
Include multimedia components (graphics, images, music, sound) and visual displays in presentations

HS-LS1-a
Critically read scientific literature and produce scientific writing

■ MATERIALS
• http://www.aces.edu/dept/fisheries/education/NationalCouncilforAgricultureEducation_AquacultureCurriculumGuide.php
• paper
• pencil

■ VOCABULARY
• aquaculture
• cost analysis

■ DIRECTIONS
1. Explore the ACES.EDU website, you may also research on other sites (though this one is rather comprehensive).
2. Students will post to our Google Classroom their thoughts on the history and the future of aquaponics in our country.
3. Students will also engineer a school aquaponics system including a cost analysis.

■ ACCOMMODATIONS
Students can work in pairs to create engineering plan.

■ EVALUATION/ASSESSMENT
Teacher observation/participation and effort analysis.
Self-analysis of classroom Connection - Also see attached rubric.

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SUBJECTS COVERED
Science and Technology

GRADES
Three - Five

OBJECTIVES
Students will…
…follow the aquarium Webquest to learn how to create a healthy environment for fish.
…follow pencast to identify the parts of a flowering plant involved in reproduction.
…dissect a flower and label parts and their roles.

STANDARDS FSS / NGSS
SC.4.N.1
The practice of science
SC.4.N.1.1
Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information, conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.
SC.4.N.1.3
Explain that science does not always follow a rigidly defined method.
SC.4.L.16
Heredity and Reproduction - A. Offspring of plants and animals are similar to, but not exactly like, their parents or each other B. Life cycles vary among organisms, but reproductions is a major stage in the life cycle of all organisms.
SC.4.L.16.1 U
Identify processes of sexual reproduction in flowering plants, including pollinations, fertilization (seed production), seed dispersal, and germination.
SC.4.L.16.4
Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and nonflowering seed-bearing plants.
SC.4.L.17
Interdependence
A. Plants and animals, including humans, interact with and depend upon each other and their environment to satisfy their basic needs.
B. Both human activities and natural events can have major impacts on the environment.
C. Energy flows from the sun through producers to consumers.
SC.4.L.17.4
Recognize ways plants and animals, including humans, can impact the environment.

MATERIALS
• http://www.oceanofk.org/webquests/fish/introduction1.htm
• plant dissection sheet
• pencast

VOCABULARY
• environment
• pistil
• stamen
• ovary
• pollen

DIRECTIONS
1. Students will follow Webquest to learn about aquarium environment.
2. Students will follow pencast of flowering plant reproduction and compare with partner.
3. Students will watch PPT and dissect a flower, tape items to lab sheet, and label parts.

ACCOMMODATIONS
Pencast flower parts can be partially completed before activity.

EVALUATION/ASSESSMENT
Students will write a summary of their learning on aquarium environments and flowering plant reproduction - including a diagram of plant parts.

ADDL INFORMATION
PPT, dissection lab sheet, and pencast available at: file:///E:/Parts%20of%20a%20Flower.htm
Thank you to CPALMS for this resource.

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# Materials Budget

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<tr>
<th>SUPPLIER</th>
<th>ITEM DESCRIPTION</th>
<th>COST</th>
<th>QUANTITY</th>
<th>TOTAL COST</th>
</tr>
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<tbody>
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<td>Amazon</td>
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<td>Fish</td>
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<td>PCSb Warehouse</td>
<td>Case of paper</td>
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<td>Walmart</td>
<td>10 Gallon Aqua Culture Aquarium</td>
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<td></td>
<td>Fish net</td>
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|          | Subtotal           | 800.45 |
|          | Tax if applicable  |       |
|          | Shipping if applicable |     |
|          | TOTAL BUDGET AMOUNT | $800.45 |

**Teacher**

**Cynthia Kuhlman**

**School**

**Highland City Elementary**

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Lesson Plans Materials Budget
### Rubrics Title - Research Product

**Student Name ________________________________**

<table>
<thead>
<tr>
<th>Project</th>
<th>Beginning - 1</th>
<th>Developing - 2</th>
<th>Accomplished - 3</th>
<th>Exemplary - 4</th>
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<tbody>
<tr>
<td>Research Report</td>
<td>No evidence of research and main idea unclear</td>
<td>Evidence of research from one source but main idea is unclear</td>
<td>Evidence of research from more than one source but main idea is unclear</td>
<td>Evidence of research from more than one source and main idea is clear.</td>
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<tr>
<td>PPT or ThingLink (graphics, text, and creativity)</td>
<td>Project is poorly written, visually unappealing (remember less is more sometimes). Doesn't reflect various resources</td>
<td>Project is not well written or visually appealing. Reflects some use of various resources.</td>
<td>Project is well written and visually appealing but does not reflect various resources.</td>
<td>Project is well written and visually appealing and reflects use of various resources.</td>
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<tr>
<td>Oral Presentation</td>
<td>Provides no details and explanations about elements in project are vague</td>
<td>Provides little detail and little explanation about elements in project.</td>
<td>Provides some accurate and some clear explanations about elements in the project</td>
<td>Provides all accurate details and all explanations about elements in the project are clear</td>
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<tr>
<td>Group/Partner Work</td>
<td>Does not perform any duties of assigned team role</td>
<td>Performs very little duties of assigned team role (often off task)</td>
<td>Performs nearly all duties of assigned team role</td>
<td>Performs all duties of assigned team role</td>
</tr>
</tbody>
</table>
Why do we dissect flowers?

- It helps us understand how pollination works!
- By identifying each part of the flower and how they relate to pollination, we can connect those relationships in nature that keep the world going round!
- We will get a better understanding as to why pollinators are so attracted to flowers!

**Petals**

Petals are colorful & sweet smelling to attract pollinators.

**Stalk/Stem**

It holds up the flower giving support to the flower. Also provides a highway for water & food to supply the plant with it’s needs.

**Nectary**

This is where a rich, sugary liquid called nectar is produced by plants to attract pollinating animals.

**Ovary**

This protects the ovules (potential seeds). Once they are fertilized they will become a seed. The ovary will become the fruit that protects the seeds.

**Ovule/Egg Cells**

The ovules (a potential seed) are like the egg in animals and once fertilization has taken place will become the seed.

**Receptacle**

This is the thickened part of a stem from which the flower grows. This is also where the flower attaches to the stalk/stem and in some cases becomes part of the fruit after fertilization e.g. strawberry.

**Sepal**

Sepals protect the petals when the flowers are still a bud.
**Pistil**
The female parts of a flower. It contains the ovary, the style, and the stigma.

**Style**
The stalk of the pistil that rises up from the ovary.

**Stigma**
The part of the pistil that catches the pollen. There is a sticky substance on the tip to catch the pollen. Shaped different according to the type of flower.

**Stamen**
The male parts of the flower, made up of filaments and anthers. Responsible for producing pollen.

**Filament**
The stalk that holds up the anther.

**Anther**
Located on the top of the filament and holds the pollen until anthers mature. Once the anthers mature, they burst open releasing the pollen.

**Pollen**
The fertilizing element of flowering plants, made of fine, powdery grains or spores.

Let’s take one more look...

Take your time, follow the steps, and have fun!
Flower Parts Lab Sheet

**Step One: Stem**
- Cut off a piece of your stem.
- Cut it in half vertically, exposing the inside workings of the stem.
- Describe what you see – use your hand lens to get a closer view.
- Tape the exposed part of your stem in the "".

**Step Two: Sepal**
- How many sepals does your flower have? _______
- Using your sense of touch to make observations.
- Hold one sepal up to the light to observe the veins.
- Use your hand lens to observe both sides. Describe your observations.
- Tape a sepal in the "".

**Step Three: Petals**
- How many petals does your flower have? _______
- Hold one petal up to the light to observe the veins.
- Describe your observations, the color & fragrance.
- Why do you suppose flowers have a color & a scent?
- Tape a petal in the "".
- Was there a difference between the sepals & petals? Similarities?

**Step Four: Stamen**
- How many stamen does your flower have? _______
- Draw and label a stamen.
- Use your hand lens, what do you see on the anther?
- Don’t tape the stamens in the "" until after the next section.
**Step Five: Pollen**

- On top of the stamen is the anther. Pick off an anther and rub the pollen grains between your fingers and across the paper. Describe how it feels and what it looks like.

- Now use the index card & tape to make your own slide.
  - Use a hole puncher to make a hole in your index card.
  - Place tape on one side of the opening, leaving the other side of the opening sticky.
  - Take a new anther and tap it on the sticky opening until you can see pollen has stuck to the tape.
  - Take another piece of tape and cover the pollen.
- Take your slide over to the microscope and then draw & describe what you see in the box below.

**Step Six: Pistil**

- Carefully pull your pistil off the receptacle and ovary.
- Observe it with your hand lens taking special care to check the stigma for the sticky substance that catches the pollen.
- How many prongs does your stigma have? _______
- Describe what you saw and touched.

- Tape your pistil in the box.

**Step Seven: Ovary**

- Using scissors, cut the ovary in half vertically.
- Use your hand lens to draw and describe what you see.

- Label your drawing.
- What do fertilized ovules turn in to?
- Tape your ovary with the ovules exposed in the box.
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Additional Information – Pen Cast of Probe Flower Parts

These are the Parts of the Flower 😊