Sustainable Farming for Our Future

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Smart Yields
Hawaii

Vincent Kimura is a "serial entrepreneur" in sustainable agriculture and technology. He strives to center the agricultural conversation as being sustainability-focused, but economically driven. Vincent is the CEO of Smart Yields, a globally recognized agricultural technology company that is revolutionizing the way small and medium-scale farms operate. He is involved in various green enterprises, including AgriGro and Inovi Green. A main focus of his work is on supporting struggling farmers around the world, and repairing food systems using technology, data, and collaboration between the public, private, and nonprofit sectors.

Vincent is a trusted and inspiring mentor for young people who are seeking to find work and launch sustainable businesses. He runs numerous internship programs, and is a mentor for the Purple Prize, which helps mission-driven companies that use technology to amplify community and regenerate ecosystems. He was also a sponsor of Hawaii's first Agricultural Hackathon in 2018.

Values   Environmentalist.   Entrepreneur   Sustainability   Creativity   Collaboration

Lessons Learned
- If we respect nature, we will reap more benefits than if we overexploit our resources. Respect leads naturally to sustainable practices; overexploitation leads inevitably to the eventual depletion of our resources.
- You can find inspiration from the past, and knowledge for the future. When you obtain both you will be able to fulfill your dreams.
- If we are to build a sustainable economy, economic progress should benefit the people, not exploit them.
- Become involved with your community: your neighbors are an important source of knowledge that can help you grow both professionally and personally.

Language Arts

- What does the term "food security" mean? Create a series of videos (no more than 10 minutes total) in which you explain what this term means; what the consequences are of lacking food security; who is most affected by food insecurity; and what sustainable alternatives are available to tackle this issue.
- Vincent believes that "A small farmer struggling is a sign of an unsustainable community." Do you agree or disagree with him? Why? Write an argumentative essay explaining your views. Your essay *must* include counter arguments to your own point of view, as well as examples from secondary sources that support your opinion.
- The years 2020 and 2021 have been a time of unrest for farmers in India. Research both the reasons for their protests and the consequences of them. Then do some research on farmers' protests in the US over the past century, and compare and contrast the two. With the information you collect, create a presentation in which you explain, as well as compare and contrast the protests by farmers in both of these countries.
- How can technology help small farmers stay competitive and become more sustainable? Write an essay in which you analyze the role of modern technology in traditional family farms. Start by analyzing Edward Tuft's example from Vincent's story, and find a couple more examples of your own to mention in your essay.

STEM Activities
- Over the course of his career, Vincent has focused his efforts on building a number of green businesses. Smart Yields, which gives farmers up-to-date access to their land use, is one of the most impactful. Create a mock-up of a farm with the crops you would hope to grow on a one-acre plot of land. Access the Smart Yields app and track the progress of your farm, or a similar farm in your community.
- Family-owned farms are a major focus of Vincent's work, due to their rapid decline in the United States. Design an app that can assist farmers with weather trends, tracking temperature, farmer to farmer collaboration, and/or cattle management, or seeding. Explain to your classmates why you think this is important and how the app design works.
    - Bonus: Develop the algorithm or code for your app and explain how this design could be useful to farmers.
- Conduct a tour of a farm in your community, or participate in a virtual tour of a farming system. Create a chart highlighting the sustainable practices of the farm you visited, and identifying areas in which the farm could improve. Highlight various farming techniques that could be used, such as Recirculating Aquaculture, Environmental Monitoring, Crop Covering, and other sustainable practices.

Sustainability Innovations
- Vincent understands that mentoring is vital for the maintenance and improvement of sustainable farming. The New Entry Sustainable Farming Project is one of many programs that helps new farmers gain experience and get training from mentors, to maximize the success of their farms.
- In addition to the standard issues facing farmers, they often spend extremely long hours surveying their crops, or struggle with weather issues. Drones in Agriculture has become one successful use of advanced technologies to identify problems and maximize the use of farmers' time. Drones can help with issues such as mechanical failures in turbines, studying soil variations, fungal and pest problems, and irrigation issues, among many others.
- Vincent funded Smart Yields with Republic, a project to get "big data to small farms" in order to help "take the guesswork out of growing." https://republic.co/smartyields
- Farming is often a difficult for students to relate to because they have not been exposed to it. Design a project to teach students about apiary farming, aquaculture, and traditional farming. Assign students to one of these three groups and have them design a basic structure for conducting this farming technique.
    - Apiary farms: How to Build a Hive
    - Traditional Farming: Build a Raised Garden
    - Aquaculture: Simple Backyard Aquaponics

Sustainable Career Pathways

- **Sustainable Farmer.** There is an increase in the number of young people who are being drawn to farming, as groups like The Greenhorns reveal. If you're interested in being a farmer, this introduction to the field of sustainable agriculture is a good place to start.
- **Agricultural Scientist** with a specialization in sustainability. If you're interested in making farming more productive, sustainable, and efficient, perhaps you would like to explore the field of agricultural science. Agricultural scientists study plant reproduction, soils, plant genetics, and more to find ways to improve farming techniques and yields while protecting the land. Learn more here.
- **Agricultural Entrepreneur (Agripreneur).** Would you like to invent and draw in new technologies to help improve farming? Perhaps you'll be an agripreneur, like Vincent. Learn more about agricultural entrepreneurship here. And you can draw inspiration from the efforts of 16 agripreneurs described here.
- **Extension Agent.** Farmers have long been supported by both governmental and nongovernmental agricultural extension offices. (In fact in China, this practice goes back about 2,800 years!). Extension agents support farmers in their area, helping them to improve crop yields and practices. They can also play a role in cultivating the next generation of farmers, for example by supporting youth groups like 4H. If this sounds like the job for you, learn more here.

Call to Action: Buy local. Get your hands in the dirt. Support small farmers with green businesses. Please visit https://smartyields.com or https://www.agrigro.com.

<center>Standards:</center>

California:

- **ELA:**
- W.11-12.1: Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from and supports the argument presented. f. Use specific rhetorical devices to support assertions (e.g., appeal to logic through reasoning; appeal to emotion or ethical belief; relate a personal anecdote, case study, or analogy). CA
- W.11-12.2: Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content. a. Introduce a topic or thesis statement; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. CA b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic. e.

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

- W.11-12.6: Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
- W.11-12.9: Draw evidence from literary or informational texts to support analysis, reflection, and research. a. Apply grades 11–12 Reading standards to literature (e.g., "Demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature, including how two or more texts from the same period treat similar themes or topics"). b. Apply grades 11–12 Reading standards to literary nonfiction (e.g., "Delineate and evaluate the reasoning in seminal U.S. texts, including the application of constitutional principles and use of legal reasoning [e.g., in U.S. Supreme Court Case majority opinions and dissents] and the premises, purposes, and arguments in works of public advocacy [e.g., The Federalist, presidential addresses]").
- WHST.11-12.1: Write arguments focused on discipline-specific content. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
- WHST.11-12.2: Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
- WHST.11-12.6: Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
- RST.11-12.7: Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

- **STEM:**
- HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

Massachusetts:

- **ELA:**
- W.11-12.1: Write arguments (e.g., essays, letters to the editor, advocacy speeches) to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
- W.11-12.1.b: Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases.
- W.11-12.2: Write informative/explanatory texts (e.g., essays, oral reports, biographical feature articles) to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
- W.11-12.6: Use technology, including current web-based communication platforms, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information
- W.11-12.7: Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
- W.11-12.8: When conducting research, gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
- SL.11-12.2: Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
- SL.11-12.4: Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, vocabulary, substance, and style are appropriate to purpose, audience and a range of formal and informal tasks. (See grades 11-12 Language Standards 4-6 for specific expectations regarding vocabulary.)
- SL.11-12.5: Make strategic use of digital media (e.g., audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
- WCA.11-12.1: Write arguments focused on *discipline-specific content.*
- WCA.11-12.2: Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
- WCA.11-12.6: Use technology, including current web-based communication platforms, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

- **STEM:**
- 9-12.CS.a.1: Select computing devices (e.g., probe, sensor, tablet) to accomplish a real-world task (e.g., collecting data in a field experiment) and justify the selection.
- 9-12.DTC.a.1: Use digital tools to design and develop a significant digital artifact (e.g., multipage website, online portfolio, simulation).
- 9-12.CS.b.1: Identify a problem that cannot be solved by humans or machines alone and design a solution for it by decomposing the task into sub-problems suited for a human or machine to accomplish (e.g., a human-computer team playing chess, forecasting weather, piloting airplanes).
- 9-12.CT.b.2: Represent algorithms using structured language, such as pseudocode.

- 9-12.CT.d.1: Use a development process in creating a computational artifact that leads to a minimum viable product and includes reflection, analysis, and iteration (e.g., a data-set analysis program for a science and engineering fair, capstone project that includes a program, term research project based on program data).
- 9-12.CT.d.9: Select and employ an appropriate component or library to facilitate programming solutions (e.g., turtle, Global Positioning System [GPS], statistics library).
- 9-12.CT.d.12: Demonstrate how to document a program so that others can understand its design and implementation.
- HS.ETS.1.3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, aesthetics, and maintenance, as well as social, cultural, and environmental impacts.