



Agriculture in the Classroom: Farming in Hawai'i's Middle and High Schools

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Abstract

Livestock and agricultural crops in Hawai'i schools are an innovative teaching tool and strategy that lets educators incorporate hands-on activities in a diversity of interdisciplinary, standards-based lessons. Agriculture in the classroom engages students by providing a dynamic environment in which to observe, discover, experiment, nurture, and learn. It is a living laboratory where lessons are drawn from real-life experiences rather than textbook examples, allowing students to become active participants in the learning process. Through gardening and livestock husbandry, students gain an understanding of ecosystems, an appreciation for food origins and nutrition, and knowledge of plant and animal life cycles. At the same time, they learn practical horticultural skills that last a lifetime. A study was conducted in which agriculture, livestock, and gardening curricula were either introduced to or reinforced in four Hawai'i Island schools to give students the opportunity to grow, learn, and eat healthier.

Introduction

It is in Hawai'i's best interest to prepare agricultural professionals and to develop individuals who understand the resources and systems involved to meet the basic needs of food, clothing, and shelter. In order to introduce agricultural curricula into K–12 schools, several concerns need to be addressed. It will take greater commitment and a concentrated effort among state and national education organizations, researchers, and agricultural organizations to increase agricultural literacy among K–12 students and



Figure 1. Kalo before harvest at Wai'ākea High School

their teachers, given the limits of the school day and the educational climate of accountability. Future program resources will need to be aligned with the Common Core Curriculum, including science, technology, engineering, and math (STEM) requirements. Additional funding avenues and partnerships need to be explored.

Objectives

- Develop agriculture activities for school-aged kids at four Hawai'i schools;
- Assist in development and/or reinforcement of existing agriculture facilities, including chicken houses, piggeries, and gardens;
- Develop lessons to provide a hands-on experience

in the STEM field;

- Increase students' interest in having a future in the agricultural industry, thus promoting food sustainability in Hawai'i;
- Clearly outline pathways to become agricultural producers or professionals as a career; and
- Introduce kids to different farming pathways, including Korean Natural Farming (KNF) methodology, and increase their understanding of methods that can increase sustainability by protecting soil and water resources, as well as plant and animal health.

Materials and Methods

Initial meetings with administrators and agriculture instructors were arranged at Honoka'a High School, Laupāhoehoe Community Public Charter School, Wai'ākea High School, and Kamehameha School (Hawai'i Island). The main goals of initial visits were to determine what agricultural areas needed improvement. Materials such as lumber, fencing, and roofing were purchased for the schools, while community members and parents also made significant contributions.

Construction of piggeries and chicken houses (flight pens) was one of the most popular ways for students to see how animal husbandry functioned in the agriculture industry. Piggeries and chicken houses also allowed stu-

dents to get a hands-on experience with raising livestock and farm-to-table operations. Students were expected to complete the piggeries, chicken houses, and school gardens, with the supervision of administration and faculty. Each school decided whether to construct a piggery, garden, or chicken house, or a combination of the three. Monthly school visits and hands-on demonstrations were conducted, touching on a variety of subjects including animal health, KNF methodology, microbiology, plant propagation, and agriculture career pathways.

The following programs were initiated at the four schools:

- Honoka'a High School: chicken house, garden
- Wai'ākea High School: chicken house, garden, piggery
- Laupāhoehoe Community Public Charter School: piggery
- Kamehameha Schools (Hawai'i Island): chicken house, piggery, garden

Outputs and Outcome Measures

Expected outcome indicators included both long-term and short-term goals, which were implemented through curricula given to school faculty, monthly workshops, and field trips for teachers and students. Outcomes were measured by participant surveys, pre- and post-tests, and follow-up visits to confirm respective agriculture program maintenance at each school.

Short-term goals included the following:

- Introducing students to growing fruits and vegetables and to livestock husbandry;
- Increasing STEM skills in an outdoor environment by implementing hands-on lessons;
- Increasing students' understanding of agricultural ecosystems, concentrating on Hawaiian ecosystems;
- Increasing students' knowledge of where their food is derived from and increasing their interest in healthy eating habits; and
- Whetting students' appetites for becoming potential agricultural producers.

Long-term outcomes included the following:

- Establishing long-term agriculture programs (egg-layers, meat producers, fruit/vegetable production) in schools;



Figure 2. Laupāhoehoe School students learn about proper vaccination techniques, needle safety, and the new Veterinary Feed Directive and are introduced to CTAHR's 4-H program.



Figure 3 (left to right). Wai'ākea High School piggery, Laupāhoehoe School piggery, and Kamehameha Schools piggery

- Encouraging children to grow a home garden of their own, raise healthy sources of meat (chickens, beef, pork, etc.) on their own, and/or follow agricultural careers;
- Helping students to live healthier lives; and
- Contributing to food sustainability in Hawai'i.

Conclusions and Impact

This grant supported development of an agriculture curriculum for school-aged children in Hawai'i. The curriculum was initially implemented at one Hawai'i Island school as a pilot program, then replicated in three other schools with community collaboration. The 4-H Extension agent assisted in coordination and planning and introduced students to 4-H clubs in their respective districts. In fulfilling the schools' STEM objectives, approved Korean Natural Farming curriculum and lessons were introduced to train the teachers and educate students with content that was reinforced with hands-on experiences. Monthly classes were convened for students on maintaining their agriculture projects. These classes averaged two hours long and consisted of a 15-minute lecture describing the activity of the day and a STEM application (e.g., a simple math or science lesson). The remainder of the time was spent planting potential feedstuffs, mulching livestock pens, feeding animals, and other essential farm tasks. Classroom activities using the microscope provided a different perspective that increased students' interest in the complexity and sustainability of systems involving micro-organisms in nearly every environmental process, including biocon-

trol of animal waste, soil health, and pest and disease control. Students also conducted simple experimental trials to compare conventional agriculture systems with sustainable techniques by evaluating their respective effects on soil microbiology, erosion, and plant and animal health. Some class sessions involved a field trip to a commercial farm where the students performed practical agricultural activities. Potential career paths were outlined and described through on-farm visits and interaction and discussions with producers and agricultural specialists who described their journeys and the jobs, skills, education, and networking opportunities that led to success in farming.

Agricultural education is an excellent way for children to acquire hands-on science and math skills, help them understand the value of food, and develop healthier eating habits. Continued joint efforts among the Department of Education, East Hawai'i schools, communities, and the Cooperative Extension Service will be needed for students to gain more access to agriculture programs in Hawai'i's schools. With dwindling interest amongst students, as well as cuts in agricultural funding in schools, more contribution is needed from both private parties and the DOE. The communities we have worked with have been crucial in supporting our efforts, giving not only time to help build these gardens, piggeries, and chicken houses, but also donating charitable contributions to help these programs and their students thrive. All aspects of agriculture, including but not limited to soil science, animal husbandry, hydrology, and natural resource management, have been implemented in these programs and will ultimately increase students' interest



Figure 4. Kamehameha Schools Natural Farming Chicken Hale

in higher education and increased food sustainability in our state. Industry, government, and the education sector all agree that increased need for a strong economy lies in a stronger agricultural industry Hawai'i. The continued development of these programs in K through 12th grade is vital to obtaining a secure future as well as a vibrant, sustainable agriculture industry. A video was created to validate and document each school's accomplishments in fulfilling their objectives of the project.

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