

embedding seeds *for better learning*

Sneaking up on Education in a Youth Gardening Program

by **Jrène Rahm** and **Kenneth Grimes**

Tamara is about to plant Swiss chard in a small pot filled with potting soil. She calls out, "I need a ruler." Buddy, who is busily potting his own seeds, asks, "Why do you need a ruler?" Tamara responds, "Because it said half-thirteen millimeter. That's a lot deep!" Tarr, who just finished potting his seeds, has some advice: "Just stick your finger in there and see!" Tamara wondered, "My finger? The first one? Not including my finger nail?"¹

(field notes, June 1996)

This vignette and others were gleaned from an evaluation project, "Ways of Talking and Thinking about Science in a Garden" (Rahm, 1998; Rahm, 2002), a study of the 4-H Young Entrepreneur Garden Program (4-H YEGP) in Denver, Colorado. As the story shows, planting seeds—an essential activity and component of 4-H YEGP—was new to most of the youth participants. Here, Tamara is learning from one of her peers how to plant without using exact measurements. While Tamara appears puzzled by such an inexact way of working, Tarr has already mastered this common gardening practice. 4-H YEGP intentionally implements a policy that Kenneth Grimes, one of the authors of this article and director of Denver 4-H Programs, calls "sneaking up on education." On the surface, the program seems merely to be a summer job for young adolescents who are too old for day-care but too young for full-time employment. Youth who are on summer vacation have often had their fill of traditional classroom structures and modes of instruction.



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In 4-H YEGP, teaching and science knowledge is embedded in the work participants do. The fact that Tamara was learning not only how to plant seeds but also how to measure most likely escaped her. Embedding learning in meaningful activities and interaction makes it much more motivating than “doing school.”

This article offers a description of an innovative youth program that embeds learning in a practical setting: a gardening program in which youth plant, harvest, and market their own produce. As an outgrowth of the gardening project, participants also interviewed scientists about their jobs in a way that underscored the practical use of science learning. These interviews are one example of the way in which community collaborations came to help define the gardening program. This article will also underline three components of the program that made it a valuable educational context for youth participants: openness to youths’ questions, possibility for ownership, and support of multiple forms of participation. We conclude with a summary of components of best practices as well as challenges the program faces. This article is essentially a synthesis of the observational and interview data Jrene Rahm collected in two individual qualitative case studies of the program in 1996 and 2001 (Rahm, 1998; Rahm & Downey, 2002) together with data drawn from informal conversations with youth and from our involvement in the program, with Jrene Rahm as researcher and Kenneth Grimes as program director.

Learning through Meaningful Work

What makes 4-H YEGP unique is its emphasis on entrepreneurship, within which science learning is embedded. The program offers youth the chance to develop many work skills. Because they receive a weekly stipend for participating, the young people also learn work ethics such as being on time and taking one’s job seriously. This all gets accomplished as youth rotate among four simple learning themes:

- Nurturing
- Harvesting
- Marketing
- Special projects

Youth 11 to 15 years old rotate through these cycles in teams of six or seven with their adult team leader. Two

volunteer master gardeners step in where needed to support work on these themes. The **nurturing** curriculum centers on plant science and basic gardening skills such as planting. **Harvesting** focuses on when and how to harvest, preparing plants for market, using and calculating weights and measures, how to package products, labeling, industry requirements, and more.

While the program could not exist without nurturing and harvesting activities, **marketing** activities connect the program with the community. As the youth explore what makes a business succeed or fail, they interact with area business owners, restaurateurs, caterers, store owners, gardening supply managers, green industry executives, chefs, and others. They even talk with presidents and vice presidents of banks as they market their products or seek start-up and business funding. One year, after the youth solicited the help of Frontier Airlines, they met the company’s president in his office. He shared

his philosophy of success with them and then gave them four airline tickets to raise additional funds for their business.

Special projects offer the most varied means to take the garden into the neighborhood and to bring the neighborhood into the garden. Youth often track their neighborhoods not only to see who lives there but also to determine what businesses, schools, churches, community centers, and industries make up the neighborhood. The entrepreneurs learn the importance of “giving back” by providing garden tours for other youth groups or by teaching preschoolers how to plant seeds. A community garden affiliated with a senior center offers opportunities for the youth to manage a farmer’s market and to conduct oral history projects with the elders. On other occasions, they may decorate the garden, led by community artists. One year, they learned all about Ndebele art. An artist in the neighborhood had been to South Africa and had helped the female artists she visited there to paint their adobe home in their Ndebele tradition. This artist shared what she had learned with the youth, each team doing its part to create garden murals in this distinctive art form.

4-H YEGP is a grassroots program whose goal is to connect community and youth development efforts in ways that empower youth while also helping them build

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Willie and the sunflower he grew from seed

meaningful connections with their community. This goal has given the program direction as it has evolved into its current form. 4-H YEGP started as an adult-run garden program in which adults marketed some of their produce to restaurants in the community. A desire to incorporate youth into the program led in 1994 to a pilot project with seven neighborhood children for whom stipends could be found. These seven were the real pioneers, enduring hardships to make it work. The hardships included not only one of the hottest summers on record but also the fact that the program lacked structure in its first year. The following year, more partners were sought to support the program, the number of youth was increased to 20, and the concept of rotating teams helped provide structure. In the second year, program leaders learned more about relating to the community and training team leaders; they also addressed the question of how many participants the garden could reasonably accommodate.

Inner-city youth gardening programs like 4-H YEGP have gained popularity. The Berkeley Youth Alternative, for example, is a youth employment program that teaches landscaping skills. It includes a community garden that offers youth “employment, a safe social scene, and a venue for rethinking their future” (Lawson & McNally, 1995, p. 211). Such initiatives share broad educational goals and are often seen as prevention programs for at-risk youth. Yet what makes them important and unique is best understood by looking at what happens in a given program day by day.

Learning by doing is a hallmark of 4-H YEGP. The on-the-job education “infiltrates” the youth as they do what they need to do to tend the garden and run their business. The youth described below are harvesting salad leaves for a sale at the Denver Black Arts Festival,

which typically sees two hundred thousand participants during a three-day weekend.

Tarr was asked to harvest green salad leaves. After some thought, Christine, a team leader, advised him, “Actually, pull out the Valeria lettuce,” because it was approaching the end of its harvesting season. Will was about to do the same with the Simpson lettuce, but Christine stopped him just in time. “I don’t want you to pull them out. What you have to do is go down [to the root] and then pick out the leaves. I know it is kind of tedious.” Christine demonstrated what she meant and added, “Remember how I told you to pick the whole leaf?” That was important in order for the product to be marketable. Marti, another student, had completed his task with spinach, so Christine asked him to harvest some collard greens: “Let’s do about ten leaves” per plant. Tarr asked about the looks of a salad leaf. Christine reminded him, “You don’t want it jagged.” She picked up a good leaf and held it up for Tarr to see. “You see this one is nice and round all over. You want *that* rather than *this*,” she said as she picked up another leaf, a bad model. She held them both in the air side by side. (field notes, July 1996)

Tara, Will, Marti, and the other youth were excited to be running their own café at the festival. Knowing that their products would be on display before a large public helped them to take ownership when their team leader, Christine, provided instruction. Here, they were learning to differentiate kinds of lettuces and to judge the appropriateness of leaves for sale at an important market for the business. As she showed them how to harvest salad leaves, Christine was also demonstrating quality control and teaching science. That some plants



Daniel and Marti displaying their zucchini

continue to produce if left in the ground was clearly news to Tarr and Will. An innocent near-mistake gave Christine an opportunity to explain why some greens have only one harvesting cycle while others keep producing—a lesson in plant identification and differentiation. Because the learning emerged from their work rather than being an end in itself, the youth embraced the attention to detail this learning required; they saw that this care would show in the products they presented to the public.

Science Learning beyond the Garden

Youth programs' broadly defined educational goals often yield learning environments that truly matter to youth (Heath, 2001; Schauble, Beane, Coates, Martin, & Sterling, 1996). In 4-H YEGP, new learning environments also often emerged through community collaborations. For instance, in the summer of 2001, the financial support of the University of Northern Colorado enabled Jrene Rahm to work with a group of seven young peo-

ple to conduct oral histories of scientists in the community. These students, who were in the garden for their second summer, volunteered for this project.

Rahm's initial study made it clear that the world of scientists was inaccessible to the youth. When we spent our first meeting brainstorming about the kinds of scientists to contact, the youth said they wanted to meet scientists "who freeze bodies, look at brains," develop "robots" or are involved in "breeding animals" and can "talk about genes and cloning." That is, their interests were driven by images of scientists and science from movies and current news.

Our next step was to develop questions for the interviews, including:

- What are some positive and negative things about what you study?
- Did you enjoy science in school?
- Do you have children, and, if so, would you like them to be scientists?
- What would you do if there were no science?

The youth decided to conduct the interviews collaboratively, each asking at least one question.

Learning about Science

Once we were actually in the scientists' workplaces, most interviews turned into friendly conversations, so that the youth could insert spontaneous questions on topics of specific interest. For instance, in the laboratory of Susan, an atmospheric scientist, a nitrogen bottle that was ejecting steam immediately led the youth to ask, "What's that?"

Susan: Well, that's a good question. This is a big tank that has liquid nitrogen in it, and we had just taken some out of here. And liquid nitrogen is *extremely* cold, it's the coldest liquid you can find. And so, it's minus 195 centigrade. I am not sure what that is in Fahrenheit, but really cold.

Michael: What's all the ice on the pipe up there?

Susan: Well, what this is, this is normally a brass pipe, but what happens here is because this is so cold, the moisture that's in the air condenses on this right away. It's like, if you have a glass and you put ice in it and you put water in it and it's real humid outside, after a while you get water on the glass, on the outside of the glass. The same process is happening here: It's just really cold and the water just condenses on it because it is so cold. So that's why it's white like that. Normally, the pipe, I don't wanna touch it because it is really cold, but normally it would be like this pipe. [Points to another pipe] It's just water that's condensed outside.

Troy: If you would stick your finger in it, can it kill you?

Susan: [giggles] If you would stick your finger in it, you would probably freeze yourself. It's extremely cold. (video transcript, August 4, 2000)

The young people learned about the chemicals Susan works with in a concrete way. In response to their observation of the ice on the pipe, Susan explained the coldness of liquid nitrogen. Then she gave a physical demonstration, pouring some of the nitrogen on the floor without touching it. The youths' continuing interest in her lab gave Susan the opportunity to give them more scientific information; she explained that atmospheric scientists use liquid nitrogen to freeze air samples collected from the outer stratosphere in metal bottles. The air samples are frozen on slides that Susan can examine under a microscope. Reinforcing the lesson, she took the youth to a back room to show them the "bathtub" she and her co-workers had constructed for cleaning air-sample bottles.

Learning about the World of Work

All the scientists shared their passion for the work they were involved in and emphasized the value of scientific literacy. For example, George, a geologist, gave the following reply to the question, "How does it feel to be a scientist?"

Well, that is a hard question. I think the word *scientist* is an extremely large word. It covers a lot of ground. But I think the biggest feeling you have is the ability to understand what people are doing and why they're doing it. And I would not understand all the makings of an atomic bomb, for instance, but a physicist would understand. But I can read about it, keep up with the field, and know what's going on all the time. (video transcript, July 12, 2000)

All the scientists demonstrated their fascination with science while being realistic about the demands of their profession. Susan, the atmospheric chemist, noted that she often worked nine hours a day, even longer when in the field. Carl, a horticulturist, shared that he had struggled with parts of his education: "When I studied organic chemistry and biochemistry and all that stuff, it wasn't really thrilling to me, but I knew I had to do it to get where I wanted to get."

Conducting the oral histories created opportunities for the youth to reflect on and revise long-held notions of science, as shown in the following exchange about our visit with George:

Tracer: I used to think that geologists had a boring job but he made it seem fun. If you make it fun and stuff like that... And he says whatever you get into, make sure you enjoy the stuff. You don't go do a job every—five days a week, basically for the rest of your life, in case you don't get fired.

Cianna: My mom doesn't enjoy her job.

Tracer: Yes, that's the point. And she comes home, she comes home depressed and everything, doesn't she? (video transcript, July 21, 2000)

Interestingly, the scientists' passion for their work left the youth with the notion that work can be more than work, that it can be something one can enjoy. Thus, conducting the oral histories had pedagogical implications well beyond the science concepts the youth learned.

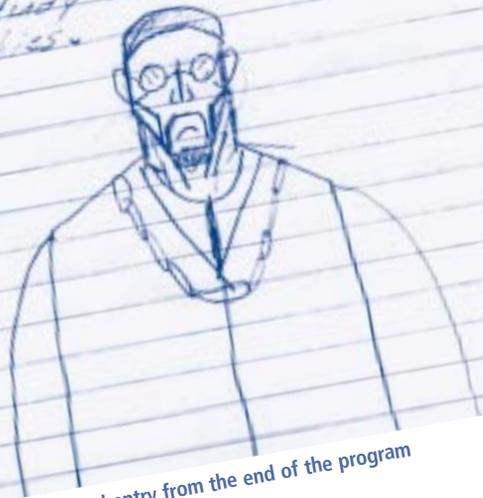
That these visits mattered to the youth is apparent from their reactions in interviews and journals:

I thought science was dumb until I learned I was doing it. (student journal, August 2000)

I liked how we got to have people tell us, instead of us having to look at a textbook... and I enjoyed the fact that we got to meet them, that we got to visit them and look at things that we haven't even known existed. (interview, August 2000)

Three of the seven youth who participated in the oral history project took steps to enter college in science-related fields. The extent to which the project led them to develop an interest in science or to confirm a prior interest is difficult to determine without a longitudinal study, but it is clear that this special project benefited the youth who participated.

The way I can describe a scientist is a regular person with a lot of knowledge of what they study. Some characteristics of a scientist know that I and some is a person with a social life, like to study and have hobbies.



A student journal entry from the end of the program

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Components That Facilitate Learning

In 1998, the National Youth Entrepreneur Symposium recognized 4-H YEGP for its unique blend of workforce preparation and education. The award further recognized the program for providing a variety of learning opportunities connected to gardening and entrepreneurship, as well as occasions for these mostly inner-city youth to expand their horizons. What makes this award-winning program work? A variety of factors contribute, including taking all questions seriously, promoting participant ownership of the work and learning, and permitting multiple forms of participation that meet the individual student's needs.

Taking All Questions Seriously

Analysis of talk about science in 4-H YEGP revealed that—in contrast to what frequently happens in school—the youth were in charge of posing questions. The youth's active questioning not only showed their interest in the program but also led to unintended opportunities for science learning (Rahm, 2002). Take, for instance, the following dialogue about flies between a student and a master gardener:

Will: What are flies really good for?

Marc: Flies? Well, they pollinate some flowers for us. They teach us patience....[giggle] What else can I think of?

Will: They get on people's nerves!

Marc: Actually, they do play a good part in the ecology. They are food for other animals like birds and other insects. And they also help break down old plant material and things like that.

Will: What do they eat?

Marc: Flies themselves probably don't eat much of anything. But their larvae, the maggots, get into all kind of decaying material and it will decay faster. You can find maggots in the compost piles.

Will: Are we gonna make a compost?

Marc: Yes, everybody is gonna take a part in it.

Will: I did compost but I didn't see any maggots.

Marc: Actually, most of the time you won't see them much; they hide in places where nobody can see them like on the edge of the pile and stuff.

(video transcript, June 26, 1996)

Will's initial question elicits two answers from Marc that impart scientific knowledge about flies. A follow-up question gives Marc the opportunity to present another fact about flies and to link this learning to gardening with the comment about maggots in compost piles. Will's next question is specifically about program activities, which Marc answers on the same level. Then Will's comment about his observation of the compost gives Marc another opportunity to link scientific fact to the hands-on work Will and his peers are doing. In the structure of 4-H YEGP, having master gardeners work next to the youth facilitated discussion of such complex ideas. This entire dialogue came out of a simple complaint—in the form of a question—about flies. That such questions were taken seriously not only provided learning opportunities but also helped youth take ownership of the program.

The Importance of Ownership

Besides allowing youth to help direct their own learning, 4-H YEGP also encouraged ownership by providing them with individual gardening plots. Jrene Rahm's (1998) study showed that youth came to "adopt" the seeds they planted. The next logical step for the following year was to assign each young person an individual plot. Before, plants were considered part of the business; now, the garden held both business plots and personal plots in which

each participant could choose what to plant. Personalizing their responsibility for plants provided an opportunity to teach more gardening skills; the individual plots became an incentive to spend extra time in the garden after program hours. More time in the garden brought more questions, which program staff could answer in more depth.

In some instances, the individual plots even became an incentive to return to the program in subsequent years. For instance, Miles said in an informal conversation in the garden, “I really wanted to plant a melon, see how a melon grows, and so I could do that. It made it worth it for me to come back.” He then displayed his garden plot, which contained a watermelon plant with many blossoms. He recalled that he “had a melon growing which was about the size of a grape, but, unfortunately, it fell off.” Miles was planning to come back after the program was over to check on his melons, especially since his whole family liked melon.

Miles also noticed that the flowers in his plot weren't growing as well as they had the previous year because someone had put too much water on them. Another youth, who had better luck with her flowers, was ready to trade flowers for a watermelon. So Miles was ready to try a new skill: “Maybe I am even gonna try to transplant some of her flowers into my plot.” Miles's ownership of his own plot not only taught him increased responsibility but also encouraged him to work collaboratively with his peers.

Supporting Multiple Forms of Participation

Though 4-H YEGP has an unprecedented return rate, some young people have struggled to become fully integrated members. Working outside in the hot sun is not easy. 4-H YEGP supports youth both by providing many different avenues for participation and by articulating a strong expectation that the youth must take responsibility for their work.

Marti's story illustrates the importance of this support. Marti's application form read: “I'm interested in working because I want to be a responsible person and this is a good way to start. I enjoy meeting people. I am also willing to learn.” Once in the program, however, Marti never volunteered for an activity, never asked questions, and never wrote anything in his notebook or journal. When put to task, he put most of his effort into looking busy. In an interview Marti shared that he hated science and had failed science in school. Judging from the assortment of T-shirts he wore, which marketed various remedial education programs, one could see why Marti might not have much faith 4-H YEGP, miscon-

struing it as yet another remedial science program like the ones he had experienced before.

Over the eight weeks of the program, however, he realized that resistance was not an option. Instead, participants were responsible for making their experience work. Program leaders underline that the garden is the youths' business, so that participant should put their best effort into everything they put their name on. Only in the last two weeks did Marti come around, as the culmination of a gradual process. When asked why he changed, he said, “When I started getting, like, 30 dollars.” When asked whether it was the money that made the difference, he added, “Yeah, but also other stuff, like working on the compost, working in the garden, getting more involved.” Somehow, Marti was able to see the value of gardening and learning to participate, as one team leader summarized:

You know, it felt like Marti was coming out of his shell and, from inside my group, what I was noticing was Marti was, like, talking to everyone and he was really into, like, the art thing. I mean the art thing was cool to him. You know, he could do it, and, like, the next thing I noticed, like, we were resetting the stone path, he's resetting the stones, he's being more assertive, like the rest of the group is not working but he is resetting the stones. I think he really changed. (interview, August 20, 1996)

Marti's identity change was brought about by many factors: the kinds of activities the program provided, the team concept the program promoted, and the multiple forms of participation, such as the art project, that the program made available. His case demonstrates that failure to participate is not necessarily an end; it can also be a means for further development, if the program supports it. Marti ended up participating in the program for five consecutive summers, most recently as a team leader at the same time that he held a job at a local fast-food chain. He now says, “I have lots of experiences in weeding and watering, working in the garden. I know the names of plants now, even some scientific names.” The program has also affected Marti's ways of acting in the community: “I am a better person, I have more friends and I talk a lot more to people.” Participation led Marti to think of himself “as very positive and outgoing, and [as] having friends.” Marti's mother noted, “The program became like an additional family to him, a place that helped him grow up and support him in ways I couldn't.” Marti is currently attending a local community college and is still in touch with the program. The program helped Marti “grow up” in his attitude toward work and toward other people.

Lessons Learned

These stories not only show what happened in 4-H YEGP but also underline the wide variety of learning opportunities typical of afterschool and community programs (Delgado, 2002; McLaughlin, Irby, & Langman, 1994). Though we have specifically drawn out only a few of the best practices typical of community-based afterschool programs in this article, 4-H YEGP exemplified many components that support and enable youth development; see the box on this page.

If, as we hope, this description inspires other community-based organizations to adopt similar practices, such organizations should be aware of some of the challenges 4-H YEGP faced. A primary consideration must be the development of shared expectations, values, and goals among youth, staff, and community members. 4-H YEGP managed this process by training youth and staff, but it remained a challenge. A similarly important challenge is assessing long-term effects of program participation. Interviews with the youth made it clear that the young people perceived the science of gardening to be very different from school science. It would be interesting to know whether youth ever applied what they learned about science from the program in school or elsewhere, as well as what impact the program might have on youths' everyday life and future aspirations.

Furthermore, gardening is not for everyone. According to the program director, though boys are initially more reluctant to participate than girls, boys were more likely to return to the program. Once in the garden, boys and girls need to be given equal opportunities to participate, despite any unconsciously held gendered notions of physical work and gardening, such as that girls plant flowers while boys dig in dirt. Finally, program leaders must remember that what matters is not the herbs and

BEST PRACTICES in the 4-H Young Entrepreneur Garden Program

- Questions are encouraged, and people are available to facilitate the discovery of answers.
- Community involvement is initiated from the beginning of the program. Community members who were involved in 4-H YEGP included researchers, community organizations, educational institutions, and families.
- A collaborative framework is instituted to promote the value of working together for mutual benefit.
- Youth and community are viewed as assets.
- Youth voices are as valued and respected as are adult voices.
- Program structure allows for flexibility within well-defined borders.
- Training of adults and youth encourages everyone to share the same expectations, values, and goals.
- Learning is grounded in experiential activities and in the needs and interests of participants.
- Openness to new or unorthodox ideas recognizes that such ideas can bring opportunity.
- Improvement comes from looking back at what worked and what didn't. Input from participants is vital for making improvements.
- Program leaders do not give up on youth, even when they are reluctant to participate at first.
- Programs "sneak up" on learning, conducting education in non-traditional ways that do not evoke negative reactions from learners.

vegetables but the youths' participation. For instance, in 4-H YEGP, some participants engaged in rather sophisticated conversations about subjects that mattered to

them such as sexual identity and racism (Rahm & Tracy, 2003). Though these conversations were not “on topic” and were not always appreciated by team leaders, they were certainly crucial for youth development (Delgado, 2002).

The rewards of negotiating these and other challenges can include positive outcomes for participants, as this paper has illustrated. Yet the rewards are not the only reason to undertake a program such as the one described here. The process itself is worthwhile: Youth and adults alike consider learning in 4-H YEGP to be an ongoing adventure.

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Notes

- ¹ In this vignette, as in all others, names of participants have been changed. Quotations reflect the actual words participants used.