

Nutrition to Grow On

**A Garden-Enhanced Nutrition Education
Curriculum for Upper
Elementary School Children**

Second Edition



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In collaboration with
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Message from the State Superintendent of Public Instruction



On behalf of the California Department of Education, I am pleased to introduce the second edition of *Nutrition to Grow On: A Garden-Enhanced Nutrition Education Curriculum for Upper Elementary School Children*. The curriculum is a valuable resource to assist local educational agencies and after-school programs in implementing high-quality instructional programs in nutrition education.

Nutrition to Grow On is an innovative curriculum for grades four through six that offers teachers a direct link between the school garden and nutrition education. The curriculum uses the garden to integrate disciplines, including science, mathematics, language arts, history, environmental studies, nutrition, and health. This approach enriches students' capacities for observation and thinking and encourages them to develop a wide range of skills.

Research consistently demonstrates that students' academic achievement is directly linked to their nutrition and health status. Nutrition education is an important part of learning the essential skills necessary for a healthy lifestyle that includes healthy eating and regular physical activity.

I have long been a champion for students' health. Healthy students not only excel academically but also are more likely to be positively engaged in social, community, and extracurricular activities. The benefits of supporting student health are far-reaching. This is why, as State Superintendent of Public Instruction, I launched the Team California for Healthy Kids campaign: to make healthy choices the easy choices.

I trust you will find this publication useful and fun to implement. I look forward to hearing about the results of your nutrition education program.

Tom Torlakson

Tom Torlakson
State Superintendent of P
California Department of



Authors' Note

This curriculum was developed with the health and well-being of the nation's children in mind. Substantial evidence confirms that improving dietary and physical activity habits can optimize the health of children. Few children know the origins of their food or appreciate the importance of local agriculture to food production. Fortunately, educators are in a position to make a difference, and school gardens have become recognized as a possible solution. Gardens not only teach children where their food comes from but also expose them to a variety of fresh fruits and vegetables. This curriculum was developed to provide teachers with the necessary tools to bring life to this concept.

The original edition was the first curriculum of its kind to directly link nutrition with gardening activities in each lesson. The primary goal was to provide children and their caregivers with the knowledge and skills necessary to make healthful dietary choices while they gain a greater appreciation of the land that provides us with food. In 1991, the *Nutrition to Grow On* curriculum was presented the Award of Excellence by the National School Public Relations Association. Most recently, the curriculum was approved by the National Cancer Institute as a research-tested intervention program (RTIP). RTIPs are in a searchable database of cancer control interventions and program materials that provide program planners and public health practitioners with easy and immediate access to research-tested materials.

Although this curriculum was originally tested with upper elementary school children, educators of all grade levels have used it in their classrooms. This curriculum was developed with California's agricultural conditions in mind; however, we are confident that the activities described in this publication can easily be adapted to a variety of regions.

Many people helped complete the curriculum. We thank all the principals and teachers who allowed us to come into their classrooms to teach and evaluate the lessons. A special note of thanks is extended to their many students who also helped tremendously in the evaluation of the lessons. They quickly let us know which activities were enjoyable and which were not.

The following schools and teachers were involved in the initial pilot testing of the lessons:

Birch Lane Elementary School, Davis Joint Unified School District

Holiday Matchett, *Science Teacher*

Markham Elementary School, Vacaville Unified School District

Sharman Young, *Fourth-Grade Spanish Immersion Teacher*

Sheldon Elementary School, Fairfield-Suisun Unified School District

Lori Lawn, *Fourth-Grade Teacher*

The following schools and staff members were involved in the formal evaluation of the lessons:

Alamo Elementary School, Vacaville Unified School District

Julie Busher, *Principal, 1999–2000*

Janet Follett, *Principal, 1998–1999*

Janet Hardt, *Special Education Teacher and School Garden Coordinator*

Nancy Miller, *Fourth-Grade Teacher*

Note: The titles and locations of the persons included in this list were current at the time the first edition was produced.





Danielle Millward, *Fourth-Grade Teacher*
Stuart Russell, *Fourth-Grade Teacher*

Fairmont Elementary School, Vacaville Unified School District

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Inge Dyrud, *Fourth-Grade Teacher*

Padan Elementary School, Vacaville Unified School District

Ruth Mickelson, *Principal*
Patty Anderson, *Fourth-Grade Teacher*
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Kristine Early, *Fourth-Grade Teacher*

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Dr. Harold Bush, *Deputy Superintendent, Education Services, Vacaville Unified School District*
Brenda Padilla, *Director of Child Nutrition, Vacaville Unified School District*

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Mary Shaw, *Program Education Chair, Solano County Master Gardener, University of California Cooperative Extension*. Mary shared her expertise with the students during most of the garden lessons.

The following master gardeners assisted in one or more of the garden lessons:

Meg Grumio—Weed Identification
Kathy Lane-Pratt—Bug Box Activity
Sandy Gainza—Dragonfly Activity
Jennifer Baumbach—Dragonfly Activity
Larry Clement, *County Director/Farm Adviser*

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Carol Hillhouse, *UC Davis Children's Garden Program Director*
Department of Pomology, University of California, Davis

Michelle Neyman, *Assistant Professor*
Department of Biological Sciences, California State University, Chico

Richard Ponzio, *4-H Specialist (Science and Technology Education), Director of 4-H Center for Youth Development, Department of Human and Community Development, University of California, Davis*

Judith S. Stern, *Professor, Departments of Nutrition and Internal Medicine, University of California, Davis*





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Graduate Students

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Peg Hardaway
Kristi Koumjian
Avtar Nijjer
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Undergraduate Students

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Esther Wong
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Heather Graham, *doctoral student*, Department of Nutrition, University of California, Davis, developed the matrix of the nutrition education curriculum and the California academic content standards. Her assistance is greatly appreciated.

Finally, the authors express gratitude to their family members and friends whose support was invaluable. This curriculum would not be making its way into the hands (and stomachs) of school-children everywhere were it not for that support.

Jennifer Morris, Ph.D.

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Introduction

Teachers are beginning to notice that all too often their students come to school hungry, show a significant drop in energy level during midmorning activities, and bring lunches that lack fruits and vegetables. This observation is a valid concern because research shows that when children come to school hungry, their potential to learn is affected. A recent review suggests that a child's brain is sensitive to short-term variations in nutrient intake (Bryan et al. 2004). In other words, what a child eats or does not eat affects his or her ability to learn. Current national recommendations promote diets high in fruits, vegetables, and whole grains but low in solid fats and added sugars (SoFAS) for persons two years of age and older (U.S. Departments of Agriculture and Health and Human Services 2010). Such diets provide the nutrients necessary for healthy growth and development and reduce the risk of chronic diseases. Unfortunately, children often eat insufficient amounts of fruits and vegetables and excessive amounts of less-nutrient-dense foods, which are generally high in SoFAS.

Some children understand why it is important to eat healthfully, but few know how, and even fewer are actually able to do so. In addition, few children truly know and appreciate where their food comes from. Many children believe their fruits and vegetables come in bags from the grocery store. Children need to be equipped with the knowledge of how to incorporate healthful foods into their diets and an appreciation for agriculture. However, children will not be able to go through this learning process alone; their caregivers need to be involved as well. Families need to learn that all foods can and do fit into a healthful diet and that the key lies in moderation and variety.

The two main objectives of this curriculum are to (1) teach upper elementary schoolchildren and their caregivers the importance of making healthful food choices and the way in which to do so; and (2) improve children's preferences for fruits and vegetables by giving children an opportunity to work with the land and grow their own produce. All lessons were tested prior to inclusion in this publication. ([See Appendix A](#) for details of the testing process [Morris, Briggs, and Zidenberg-Cherr 2002].)

For a curriculum to be effective, research shows that it should be based on sound theoretical principles. This curriculum is based on the social cognitive theory (SCT)—the belief that children's behavior is influenced by several factors. Personal (e.g., knowledge), behavioral (e.g., skills), and environmental (e.g., visual reinforcement) factors are believed to influence children's health-related behaviors, such as dietary choices (Bandura 2004). Young children are greatly influenced by their surroundings, so the curriculum uses the environment to stimulate learning about nutrition and academic subjects, such as science and mathematics. This curriculum teaches children about nutrition while taking them through the steps of planting, maintaining, and harvesting their own vegetable garden. Garden activities have been incorporated into the lessons to teach children more about where their food comes from and reinforce the principles of the SCT. Another benefit of having a garden at a school is that it is a constant visual reminder that good nutrition is important even on those days when no nutrition lessons are formally presented.

Curriculum Principles

The principles guiding the development of this curriculum were simple. The lessons had to be fun, easy to implement, integrative, and adaptable.





Fun. First and foremost, the curriculum is meant to be fun and interactive for the students and the teachers. Children must be constantly stimulated. No one would continue with a healthful lifestyle if he or she saw it as nothing more than another chore.

Easy to implement. The authors wanted to make the curriculum easy for teachers to use; therefore, preparation time is minimal. Most of the lessons require few materials to be gathered or prepared prior to the activity. Detailed background information is included in each lesson so that little additional research, if any, is needed.

Integrative. From the first day of school to the last, teachers are asked to teach their students according to a set of standards or a curriculum framework. Standards are necessary to establish consistency among teachers and schools in many regions. Some of the standards were incorporated into this curriculum so that teachers would not feel as though they needed to add yet another activity to an already full schedule. This curriculum was developed with the California content standards and curriculum frameworks in mind. The lessons offer students opportunities to practice the skills called for in the content standards. ([Appendix B](#) shows the academic content standards supported by each lesson.)

Adaptable. The dynamics of all classrooms are unique. What works in one classroom may not work in another. Another requirement for this curriculum was that it had to be adaptable to any educational situation. The hope is that teachers take what they wish from these lessons to make them fit their own classroom. The lessons have enough structure to be taught exactly as written but also have enough flexibility to be modified as needed. In addition, the lessons include enough activities to provide a challenging environment for older children but may be broken down into much simpler activities for younger children.

Organization of the Curriculum

The curriculum is divided into nine lessons on topics related to a healthy lifestyle. Although the lessons were developed to build on one another, they may also be taught independently. Enough information is presented for each lesson to be taught exactly as is. However, teachers are encouraged to adjust lessons to better fit the dynamics of their individual classrooms. Because the lessons are designed to build on one another, they should be taught in the order presented in this curriculum. The earlier lessons lay the groundwork for subsequent activities.

Each lesson was developed with several objectives in mind, most of which are behavioral in nature. They are noted on the first page of each lesson along with an objective for the hands-on gardening activity. The materials needed for the nutrition lesson and gardening activity are noted for each lesson as well. Changes are encouraged if they make the lesson appropriate for a given classroom. All the necessary handouts are included at the end of the lesson.

All lessons begin with a brief review of the previous lesson. Sometimes this material is necessary for the activities that follow. If these lessons are presented independently of each other, make sure that the students have ample background knowledge to be able to perform the learning activities.





The nutrition portion of each lesson is intended to last approximately one hour, and the hands-on gardening activity may be taught in about 30 minutes. Most activities can be modified to increase or decrease the duration of the lesson. The nutrition and gardening activities are meant to be complementary and function as a form of reinforcement. During the formal evaluation of this curriculum, the gardening activities were taught within a day of the nutrition lesson. Although the length of time between the two activities may vary among individual classes, the nutrition lessons could be taught within a week of gardening activities. Selected hands-on gardening activities may be taught without students going through the actual planting and harvesting of a vegetable garden; however, omitting the hands-on activities may not be as beneficial to the students.

If the hands-on gardening activities are to be taught along with the nutrition lessons, it may be better to teach the lessons together on alternate weeks. Such scheduling allows ample time for the growth of most crops. Be sure to check the approximate length of time until you harvest the crops you choose to plant, because that will determine when you begin teaching the lessons and when the students can make snacks from the food they grow.

The “Additional Activities” section in each lesson contains ideas for follow-up and an optional snack. The last section, “Background Information,” provides teachers with additional information about the lesson.

Each lesson includes a sheet of “10 tips” and should be sent home to the students’ families within a few days of the lessons being taught in class. The purpose of the tip sheets is to educate the students’ families about the material students are learning in class and promote family discussion about healthful eating choices. There is substantial evidence that parental involvement is necessary for the success of any educational program. The more that caregivers are involved in their children’s education, the more the children will appreciate the importance of what they are learning.

Tips on Starting a Garden

Starting a garden at a school can be a very easy task. There are a few things to consider, however, when planning the garden. First, school administrators must be contacted to gain their support and to find out whether there are any site regulations. Talk to the principal, vice principal, janitors, and other maintenance staff who need to be informed of the garden project. Second, the size of the area you need will depend on your desired level of gardening. The garden may range in size from a couple of pots on a windowsill to a 10-foot-by-4-foot raised bed. Third, the location of the garden is important. It must allow sunlight each day. Fourth, the condition of the soil must be determined. If the soil was already used to grow crops, some additional nutrients may be needed. However, you may need to start fresh with brand-new soil if nothing is currently growing in it. Last, determine how you will get water to your crops. Watering can be done with cans, hoses, or a drip irrigation system.

If you are unsure about any of these steps, consult a local nursery or master gardener through your county Cooperative Extension. You may even be able to find a knowledgeable parent at the school who is willing to help in the planning stages. In addition, it is a good idea to contact other members of the community. Many people may be able to donate labor, money, or supplies to help get the garden ready.



Assessment

Assessment is built into this curriculum. Nutrition quizzes are aligned with the objectives for each lesson (see [Appendix C](#)). Teachers may use these quizzes, as they deem best. For example, teachers may ask students questions after each lesson, give the whole set to the student once all the lessons have been taught, or distribute the questions before and after teaching the lessons to determine changes in the students' knowledge. It is recommended that teachers read aloud the questions to students below fourth grade if students cannot read with proficiency.

Another idea for assessment of students' learning is to have the students keep journals or notebooks. Ask students to write about their various food and garden-related experiences. At various times during the lessons, the students may also keep track of the foods they eat for one day. At the end of the project, students can go back and compare their diets to MyPlate recommendations (see [Lesson 3](#)). Ask them to look for any improvements in their diets. You may also have students keep track of any new vegetable they try and record what they thought of it. Research shows that children often take 10 to 15 tries before they begin to like a new food (Birch et al. 1987; Blanchette and Brug 2005; Robinson-O'Brien, Story, and Heim 2009).

These are only a few ideas for assessment. Teachers are encouraged to do whatever works best in their classrooms.

Suggested Teaching Strategies

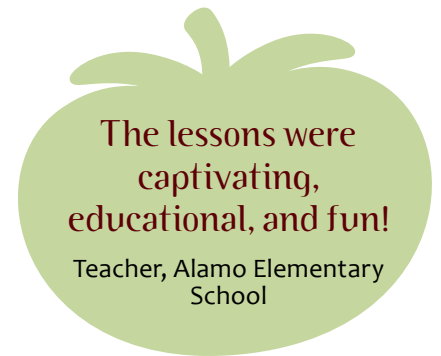
Before beginning this project, check the students' emergency information cards for any known allergies. Such information may influence the snacks prepared or the vegetables selected for planting. The following strategies for teachers are suggested to maximize the value of these lessons for the students:

- Mention healthy lifestyle habits in regular classroom discussions by using food, exercise, and garden-related examples whenever possible. For example, teach fractions by cutting an apple into pieces instead of using a circle. Do not wait for the occasional nutrition lesson to emphasize the importance of good health.
- Work with the nutrition services staff at the school. Consider arranging a tour of the cafeteria or ask a staff member to visit the classroom to help during a cooking activity. This strategy helps to strengthen the link between the classroom lessons and the lunchroom. Often a student's most healthful meal of the day is the one received from the school cafeteria.
- Include the following health-related questions as daily journal topics: What does it mean to be healthy? What are some things that I can do to stay healthy? What are some foods that I can choose as healthful snacks? Why would they be considered healthful? How can I make them a part of my daily routine? What are some activities that I like to do that keep my body moving?
- Post nutrition-related news and activities on a bulletin board. Consider displaying the MyPlate poster in the classroom throughout the year.





- Remember that it is important for teachers to be good role models. All foods can be included in a healthful diet; there are no good or bad foods, just good or bad diets. Teachers should try to include fruits and vegetables in their own snacks and lunches.
- If students bring their own snacks or lunch to school, encourage them to bring healthful items. Once a week, have the students talk about what they brought and why and brainstorm on other choices for snacks and ways to eat them. Be sensitive to the fact that some students will have a difficult time bringing in particular foods.
- Encourage students to bring healthful snacks for class parties. Try 100 percent real fruit juice instead of sodas, and offer pretzels or popcorn instead of potato chips. Other ideas include graham crackers or cut-up fruits and vegetables to go along with pizza. What about trying a pizza with vegetables on it? Check out the lesson on snack making ([Lesson 9](#)) and some children’s cookbooks for more ideas of snacks that can easily be made in the classroom.
- Do not use food as a reward. Consider classroom items, such as pencils, erasers, or notebooks. If a garden is planted as part of the lessons, some students will consider it a reward to go out to the garden at a designated time every day.
- Impress upon the students that they should look at their diets over the course of a few days and not just one day or meal at a time. If the diet is a little higher in fat one day, the diet the next day should be lower in fat.
- Consider long-term class goals when doing the gardening activities. It may be possible to plant a themed garden relevant to upcoming topics during the year. Consider also what snacks you can make when the garden is ready for harvest. The goal is to allow the students to taste everything they grew during the year. You may need to speak to a local master gardener or nursery for ideas that work with the local climate and the timing of planting.
- If a class decides to plant a garden, walk the class by the garden daily (for example, on the way to or from recess) to keep track of the garden’s progress.
- Have a parent or master gardener come into the classroom to assist on the days of the gardening activities. It helps to have an extra adult or two in the garden during the outdoor activities.
- Add “gardener” to the list of class roles. One student or several may be assigned the responsibility of keeping an eye on the garden and watering or weeding when necessary. He or she can check the garden and inform the class when something new sprouts.
- Encourage the community to get involved with the school garden. Local businesses may be able to donate money, labor, or resources to get the project operating.



Appendix D, “Nutrition Education Resources,” contains a list of helpful Web sites and professional associations.