

Garden-Based Learning in Basic Education: A Historical Review

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INTRODUCTION

Most people today would agree that the process of acquiring an education should involve more than obtaining high grades. Education is concerned with what students know and can do, how they interact with others and what they will face in the world (Drake, 1998). It means being able to apply skills learned within real-life contexts. Historically, educational systems have been established with the purpose of developing academic, vocational and life skills as well as influencing moral, social and personal development. The methods of instruction as well as the curriculum content have been in a constant state of flux over the ages, reflecting the cultural, social and economic values and needs of communities. Today, the ideas of experiential and naturalistic education, integrated curriculum, and the ideals of environmental education and agricultural literacy have found a new context for instruction beyond the four walls of the classroom—the school garden.

Why are school gardens gaining popularity in some parts of the United States and across the globe? Is this a new trend? How has garden-based education impacted the areas of academics, environmental education, nutritional awareness and community life? This review addresses these questions by tracing the history of garden-based learning, describing the philosophy and underlying theoretical frameworks of this approach and presenting the results of specific evaluations of some garden-based programs.

History and Philosophy of Garden-based Learning

“ . . . to open the child's mind to his natural existence, develop his sense of responsibility and of self dependence, train him to respect the resources of the earth, teach him the obligations of citizenship, interest him sympathetically in the occupations of men, touch his relation to human life in general, and touch his imagination with the spiritual forces of the world”
(Bailey, 1909).

The idea of incorporating the natural outdoors as an integral part of children's educational curriculum is not new. The philosophy behind garden-based education is actually an amalgamation of the philosophies behind experiential education, ecological literacy and environmental awareness, and agricultural literacy. In other words, it involves teaching children through personal discovery in natural settings, where they learn ecological principles that govern all life, as well as develop a sense of connection with the land. Tracing these thoughts back to their propagators we find some of the most prominent philosophers and leaders in the field of education setting the course for contemporary thinking about school gardens and garden-based learning.

Early Philosophers: Comenius, Rousseau, Pestalozzi and Froebel
As far back as the seventeenth century, John Amos Comenius (1592–1670) believed that education should be universal, optimistic, practical, and innovative and should focus not

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only on school and family life but also on general social life. He stated “A school garden should be connected with every school, where children can have the opportunity for leisurely gazing upon trees, flowers and herbs, and are taught to appreciate them” (Weed, 1909, cited in Sealy, 2001). A hundred years later, Jean-Jacques Rousseau (1712-1778) described the defect of teaching a child “about” things rather than the things themselves. He stated, “You think you are teaching what the world is like; he is only learning the map.” Rousseau emphasized the importance of nature in education, stating that nature was the child’s greatest teacher and that “his knowledge of the natural world serves as a foundation for his later learning” (cited in Sealy, 2001).

Rousseau’s teachings were adopted by Johann Heinrich Pestalozzi (1746-1827) who spoke of observation and activity in learning rather than learning mere words. Pestalozzi started his school after working with 25 orphans using gardening, farming, and home skills as practical education. He visualized the balance between the three elements, “hands, heart, and head.” Friedrich Froebel (1782-1852) who studied Pestalozzi’s fundamental principles, went a step further to emphasize “doing” as well as observing in such a way that is not merely mechanical, but rather incorporates the creative energies of the child such that the child is “elevated to productive activity in the full sense of the word” (Froebel Web site, 1998). Froebel was one of the most effective proponents of school gardens in the nineteenth century (Sealy, 2001).

Philosophers of the 20th Century: Montessori, Dewey and Gandhi
Maria Montessori (1870–1952), the founder of the Montessori method of education which ushered in a new era in child education, spoke of “first the education of the senses, then the education of the intellect.” She believed that a garden could help children in their moral development and appreciation of nature. In her own words, “When he (the student) knows that the life of the plants that have been sown depends upon his care in watering them...without which the little plant dries up...the child becomes vigilant, as one who is beginning to feel a mission in life” (Montessori, 1912).

John Dewey (1859–1952) referred to the reorganization of rural schools and the utilization of agriculture in education in the early part of the twentieth century as a “movement towards greater freedom and an identification of the child’s school life with his environment and outlook” (Dewey, 1915). With reference to school gardens, he states that in such schools, “opportunities exist for reproducing situations of life, and for acquiring and applying information and ideas in carrying forward of progressive experiences. Gardening need not be taught either for the sake of preparing future gardeners, or as an agreeable way of passing time. It affords an avenue of approach to the knowledge of the place farming and horticulture have had in the history of the human race and which they occupy in present social organization. Carried on in an environment educationally controlled, they are means for making a study of facts of growth, the chemistry of soil, the role of light, air, moisture, injurious and helpful animal life, etc. It is pertinent to note that in the history of man, the sciences grew gradually out of useful social occupations” (Dewey, 1944).

Mahatma Gandhi (1869–1948), another naturalistic educator, believed like Rousseau that natural and rural environments are important educative contexts (Aggarwal, 1985). Gandhi made a valiant attempt at rescuing education from the confines of the four walls of a classroom. Gandhi’s model of self-sufficiency of schools was tailored toward developing communities where government funding for education was not adequate. He believed that a certain craft such as spinning, could be used as an educational context, and also enable the school to operate self-sufficiently (Aggarwal, 1985).

Tracing the History of Garden-based Learning and School Gardens

The First School Gardens in Europe and Australia

In 1811 Prussia, the first compulsory school system that included gardening was developed, and in 1869 school gardens became a law. Erasmus Schwab, who was hired to enforce this law, published *The Public School Garden* in 1871 emphasizing that the

natural sciences and agricultural and vocational sciences could be learned in the garden (Sealy, 2001). New educational theories swept the world around the turn of the century and the kindergarten movement developed by Froebel started to spread quickly around Europe. The school child was no longer considered an “information receptacle” but rather a “growing flower” (Robin, 2001). In Australia, the school garden movement was strongly influenced by the annual School Garden Conference in 1903, sponsored by the Australian Natives Association. This led to the propagation of school gardens in the early decades of the twentieth century that were viewed as ideal for integration with the educational curriculum and for incorporating the standards of “progressive conservation” with its concerns for the responsible stewardship of nature as well as the ideas about connections between nature, hard work and moral improvement (Robin, 2001).

School Gardens in the United States

At the end of the 19th century, the Massachusetts Horticulture Society was instrumental in providing educators with a background for teaching gardening in schools in the United States. In 1891 Henry Lincoln Clapp was sent to Europe to study school gardens and on his return he installed the first school garden in America at George Putnam School in Roxbury, Massachusetts. Van Evrie Kilpatrick, who was hired as director of the School Garden Association of New York wrote, “School gardens should be maintained by the city, the city owes it to the children whom it has deprived of breathing places and beauty spots through want of foresight” (Sealy, 2001). Thus, school gardens in the United States were initially introduced in urban schools for aesthetic rather than educational reasons (Sealy, 2001).

Youth gardening became a national movement and by 1918 every state in America and every province in Canada had at least one school garden (Sealy, 2001). In 1916 over one million students contributed to the production of food during the war effort, following the proclamation by President Woodrow Wilson. However, the educational value of school gardens diminished and waned after World War I and their brief resurgence during World War II by the growing of Victory Gardens declined after 1944. Playgrounds and athletic fields

took over garden plots and schools became more focused on technology (Sealy, 2001).

The second wave of school gardens in the United States occurred between 1964 and 1975 as an offshoot of the educational reform strategy for the “war on poverty” (Meyer, 1997, cited in Yamamoto, 2000). With the birth of the environmental movement, public concern for the environment led to the conception of school gardens as a progressive, interactive educational link for children to understand and connect with “life processes” and environmental understanding. However, school gardens did not gain firm roots in public education, weakened by the conservatism of the 1980s (Yamamoto, 2000).

In 1993, The American Horticultural Society held its first symposium based on youth gardening entitled “Children, Plants, and Gardens: Educational Opportunities.” The aim was to recognize ways in which children’s gardens could support educational curricula (Sealy, 2001). This led to the spread of school gardens during the last decade.

Theoretical Frameworks of Garden-based Learning

A scientific inquiry into why gardens are a useful context for learning could be informed by research in the fields of developmental and educational psychology, from theories of experiential education and intelligence, and theories underlying the benefits of integrated curricula.

Theories of Experiential Learning

Experiential education is a process through which a learner constructs knowledge, skill, and value from direct experiences. According to Kolb’s experiential learning model (Kolb, 1975 in Weatherford & Weatherford, 1987) concrete experience leads to observations and reflections. These, in turn, result in the formation of abstract concepts and generalizations of these concepts as well as the capacity to test the implications of these concepts in new situations.

In a socio-ecological model of a child’s outdoor landscape (Moore & Young, 1978), it is proposed that a child lives simultaneously in three interdependent realms of experience: the physiological-psychological environment of body/mind, the sociological environment of interpersonal relations and

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cultural values, and the physiographic landscape of spaces, objects, persons, and natural and built elements. The freedom of the outdoor environment serves as a balance to a child's supervised indoor environment, resulting in volitional learning.

Theories of Intelligence

Intelligence is identified in reference to a socially recognized and valued role that appears to rely heavily on a particular intellectual capacity (Gardner, 1999). Gardner suggests that we have at least eight intelligences, namely, linguistic, musical, logical-mathematical, spatial, bodily kinesthetic, interpersonal and intrapersonal and that only two—logical-mathematical and linguistic—are given importance in schools. The latest addition to the seven intelligences, the naturalist intelligence is defined as the person's ability to recognize and classify his or her natural environment. Gardner claims that just as children are ready to master language at an early age, so too are they predisposed to explore the world of nature (Gardner, 1999). When the method of instruction is geared toward all the different types of intelligence, a learner can be said to have learned more completely, having an opportunity to use his or her different learning styles (Drake, 1998).

Developmental Theories

Developmental psychologists have attempted to study children's relationships with nature and whether an innate sense of kinship with nature manifests by the time they reach a certain age (Tuan, 1978). Edith Cobb (1969) wrote that middle childhood (from approximately five to twelve years, the period between the "strivings of animal infancy and the storms of adolescence") is when the "natural world is experienced in some highly evocative way." Tuan (1978) additionally suggests that children have to be taught by adults about their natural environment, as "nature is an inarticulate teacher." Children show a natural curiosity about the world, but this curiosity may be easily repressed if adults fail to nurture it.

Benefits of an Integrated Curriculum

Garden-based learning offers a context for integrated learning. An integrated curriculum is often associated with real-life problems in contrast with a traditional subject-based

curriculum. This provides a vehicle for higher order thinking as students are challenged to move beyond memorization, to see patterns and relationships and pursue a topic in depth. They are engaged in constructing knowledge rather than accumulating information and they also develop analysis and synthesis skills (Drake, 1998).

Contemporary Trends

The contemporary impetus to the school garden movement in the United States is largely influenced by the thoughts of educators, environmentalists, and agricultural reformists. In 1995, California's State School Superintendent Delaine Eastin mandated "a garden in every school" to "create opportunities for our children to discover fresh food, make healthier food choices, and become better nourished." Though this aim has not been fully realized, Eastin's vision gave impetus to the development of gardens in other states as well.

With regard to the value of outdoor experience on child development, David Orr, author of *Earth in Mind* (1994) and *Ecological Literacy* (1992) states that children raised in ecologically barren settings are deprived of the sensory stimuli and the kind of imaginative experience that can only come from biological richness. Robin Moore, director of the Natural Learning Initiative (1995), suggests that children's gardening can be introduced within the broader frame of reference of sustainable development, regenerative design, and biodesign. He argues that children, the future consumers and participants of democracy, must interact daily with an educational environment containing a diversity of living ecosystems. Gardening in the primary grades is "the most feasible" pedagogical approach for ensuring this type of daily learning experience as well as for "reversing a worrisome trend" in the opposite direction.

Alice Waters, a prominent figure in the school garden and organic agricultural movement as well as the founder of "The Edible Schoolyard" in Berkeley, California, believes that having a garden for food production at schools will teach compassion, patience, and self-discipline. The "Edible Schoolyard" reflects this belief as a model in the education of social responsibility, community participation, and sustainable

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agriculture. The program involves students in all aspects of farming a one-acre garden, including preparing, serving, and eating the food harvested.

Taking a glimpse at trends across the globe, Learning Through Landscapes (LTL) is an organization in the United Kingdom that has attempted to move school grounds to the top of the educational agenda. Bill Lucas, the director, describing the goals of LTL, states that a school garden is as important for urban as for rural schools, “helping to bring about a better understanding between town and country,” and a “keen power of observation in all things alive.” LTL recognizes the importance of gardening, through which children gain firsthand experience with the seed-to-seed cycle, the rhythm and traditions of the harvest, and the taste, touch, and smell of fruit, vegetables, and flowers.

In Africa, (Horst, Morna & Jonah, 1990) there has been little emphasis on practical skills in the curriculum until recent years. The scenario is gradually changing with gardens being the main elements in Niger’s new educational policy and in Sierra Leone, where up to 80 percent of all schools have hands-on gardening classes. After gardening in schools, children are more likely to help their parents farm at home, eager to show them what they have learned. This develops prestige for farming in the minds of children.

The Impact of Garden-Based Learning and School Garden Programs

Garden-based learning programs have gained popularity across the international educational landscape. Today there are many programs for both formal as well as nonformal education settings that emphasize numerous strategies and goals for impact. Much of the literature on garden-based programs, however, has focused on practical approaches for starting and managing school gardens. Comparatively few studies have traced the benefits of garden-based learning in the lives of children.

Proponents of children’s garden programs talk of the multiple developmental benefits that school gardens can have on children—namely, emotional, aesthetic, and even spiritual in addition to the more obvious social and intellectual benefits, in a variety of contexts. For instance, The Master Gardener Classroom Garden Project provides inner-city children in the San Antonio Independent School District with an experiential way of learning about horticulture, gardening, themselves, and their relationships with their peers (Alexander, North & Hendren, 1995). The gardens are used as part of the curriculum as well as a reward for hard work during the day. An evaluation of the benefits

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PURPOSES OF SCHOOL GARDENS IN DEVELOPING AND DEVELOPED COUNTRIES

(Desmond, Grieshop, Subramaniam, in press):

- to support core academic training, particularly in science and math
- to add a sense of excitement, adventure, emotional impact and aesthetic appreciation to learning
- to teach basic skills and vocational competencies
- to teach about food and fiber production
- to teach ecological literacy and/or environmental education
- to teach sustainable development
- to produce food and other commodities for subsistence consumption and trade
- to improve nutrition, diet and health

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of this project was conducted by collecting data in the form of qualitative interviews of second and third graders as well as parents, teachers, a master gardener, and a school principal. These interviews indicate that there were many positive effects of working in the garden. According to the researchers, the children had received lessons in moral development, enhanced their daily academic curriculum, gained pleasure from watching the products of their labor flourish, and had a chance to increase interactions with their parents and other adults. In addition, the children learned the value of living things, plus the anger and frustration that occurs when things of value are harmed out of neglect or violence.

Priscilla Logan, educational consultant and permaculture instructor from Santa Fe, New Mexico, listed four reasons for using gardens as a teaching method (Sealy, 2001):

- 1 **High retention rate.** When children work in gardens 90 percent of their experience is classified as hands-on. A study conducted by Bethel Learning Institute documented different student retention rates based on teaching method, with 11 percent retention for lectures, 75 percent for learning by doing, and 90 percent when students teach other students.
- 2 **Empowerment.** A connection to the earth gives students a sense of achievement and motivation.
- 3 **Academics.** Science, math, social studies, art, language, and many other subjects can be taught using nature as the learning laboratory, making these concepts more meaningful.
- 4 **Teamwork.** Facilitating cooperation and communication in a real world setting makes learning teamwork possible; the class goal of a successful garden becomes more important than individual achievement.

The literature in the area of garden-based learning ranges from subjective accounts about the importance of gardens in the form of self-reports, parents' and teachers' observations as well more empirical assessments of the impact of school gardens.

Impact on Academic Achievement
In one well-evaluated study on experiential education, reported in *Closing the*

Achievement Gap: Using the Environment as an Integrative Context for Learning (EIC, Lieberman & Hoody, 1998), 12 state education agencies sought to identify successful environment-based educational programs and conduct evaluations in various domain areas. The 40 successful programs that use the EIC design share the basic educational strategies of a multidisciplinary approach, hands-on learning experience, problem-solving, team teaching, individualized design, and an emphasis on developing knowledge, understanding and appreciation for the environment. The documented impacts of the programs were:

- better performance on standardized achievement tests of reading, writing, math, social studies and science
- reduced classroom management and discipline problems
- increased attention and enthusiasm for learning
- greater pride and ownership of accomplishments.

Impact on Environmental Literacy
Garden-based learning has been especially beneficial in environmental or ecological literacy as well as in teaching scientific concepts. According to the North Carolina Environmental Education Plan (1995), hands-on experiences are the best way for students to develop an understanding of their complex world and their place in it. The Down-to-Earth Program (DTE) aims to provide this kind of learning with the help of school gardens as a knowledge building tool (Williamson & Smoak, 1999). The main purpose of the DTE program is to introduce youth to sustainable agriculture and environmental education using the scientific method as a conceptual and hands-on learning process that stresses critical thinking, reasoning, and problem solving. Youth educators draw from a rich mixture of multidisciplinary topics such as agriculture, natural resources, environmental management, health and human safety, and horticulture. The impact of the Down-to-Earth Program has been seen through increased knowledge of the scientific method, plants, fertilizer, and pests as well as positive attitudinal and behavioral changes, increased awareness, and facilitation of higher order thinking processes.

With similar goals of achieving an interdisciplinary approach to environmental education, Project Green incorporates the school garden and gardening activities into all disciplines, including math, science, English, history, social studies, and art (Skelly & Zajicek, 1998). An evaluation of the project comparing experimental and control groups found that children in the experimental group, who participated in Project Green, had more positive environmental attitudes, with second graders showing higher scores than fourth graders. More specifically, it showed that students who engaged in more outdoor related activities reported more positive environmental attitudes.

Programs such as the Life Lab Science Program have created garden-based projects for learning science and connecting it to all areas of learning. Life Lab serves teachers in the Monterey Bay Area and the Greater Bay Area Regions, as well as throughout the nation. Their mission is to encourage respect for life and the environment, appreciation and understanding of ecological systems, and environmental stewardship with the goal of a sustainable future.

Impact on Children's Health and Nutrition

School gardens have been used to teach children about nutrition and how to make healthier food choices (Morris, Briggs, & Zidenberg-Sherr, 2000). Researchers emphasize the importance of nutrition education and the need to develop innovative methods to motivate young children to develop lifelong healthy eating habits. They state that school gardens serve as an ideal context for nutritional programs. Research demonstrates that children who plant and harvest their own vegetables are more willing to taste and like them (Morris, Briggs, & Zidenberg-Sherr, 2000). In a garden project called Nutrition in the Garden (Lineberger & Zajicek, 2000), teachers were guided to integrate nutrition education as it relates to fruits and vegetables. Evaluations of students participating in the program showed that their attitudes toward fruits and vegetables had become more favorable and they were also more likely to choose fruits or vegetables as snacks, compared to before they participated in the gardening program.

In a garden project with similar goals, the impacts of the garden have led to more benefits than the original aim of improving nutrition and nutritional awareness in children (Canaris, 1995). Gardening activities enhanced the quality and meaningfulness of children's learning on a wider level, with children communicating with their communities and parents as well as learning mathematical and scientific principles in the garden.

Nutritional programs in the garden have been shown to have multiple benefits. The Nutrition Education and Training Section of the California Department of Education states five benefits of garden-based nutrition education (Sealy, 2001):

- building bridges between school and community,
- promoting the transfer of information from one generation to another,
- developing environmental awareness in students by caring for a living environment,
- providing opportunities for cultural exchange, and
- building life skills.

Impacts on Families and Communities

The Evergreen Elementary School in West Sacramento, California offered small garden plots to families who were non-English speaking immigrants, primarily from Hmong and Mien cultures, who rarely participated in their children's activities. A demonstration garden grew vegetables and other plants familiar to the Hmong and Mien participants, thus encouraging participation by the parents. This project raised the self-esteem of the children as well as the non-English speaking parents, who were then valued as teachers.

Hands-on involvement in children's designing, creating, caring for, and using school nature areas can help improve children's academic performance as well as inculcate the willingness and capacity to work for the communities of which they are a part (Bell, 2001). In addition, teachers are gaining an appreciation for the potential of school ground projects that integrate disciplines, produce tangible outcomes and encourage children to build ties with their communities. "Lived experience" motivates students and shapes their learning in lasting and personally significant ways.

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Finally, garden-based learning may become an important approach for working with challenged populations of youth. Kaiser (1976) suggests that there are beneficial effects of including a gardening program in the school curriculum for emotionally disturbed, autistic and mentally challenged children. Garden projects have been demonstrated to have a positive impact for 12 year olds with learning disabilities (Sarver, 1985, in Hendren, 1999). As Arlene Marturano, coordinator of South Carolina Garden-based Learning Network aptly states, "all children can experience success in a school garden" (Marturano, 1999, in Sealy, 2001).

Conclusion

Garden-based learning has evolved through the ages, changing with the philosophies of our education systems and the values of our times. It is reasonable to expect that our current ideals of educating children through an integrated curriculum, dealing with issues relevant today, and recognizing the unique potential of every child could be practically realized through the stable establishment of school gardens. Further study of the long-term influence of garden-based learning in the lives of children is needed to better understand its value and impact. In the future, different ways to incorporate this form of learning may be explored in order to widen its scope and range in different contexts, whether in special education or as a strategy for addressing learning disabilities. ■

For more information on current pedagogy, strategies, best practices, impacts, outcomes, and resources for garden-based learning, refer to Desmond, D., Grieshop, J. & Subramaniam, A. (in press).

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References

- Aggarwal, J. C. (1985). *Theory and principles of education*. New Delhi: Vikas Publishing House Pvt. Ltd.
- Alexander, J., North M. W., & Hendren, D. K. (1995). Master garden classroom garden project: An evaluation of the benefits to children. *Children's Environments* 12(2): 256–263.
- Appadurai, A. (1996). *Modernity at large: Cultural dimensions of globalization*. Minnesota: University of Minnesota.
- Babcock, E. B. (1909). *Suggestions for garden work in California schools*. Berkeley: University of California Press.
- Bailey, L. H. (1909). *The nature study idea*. New York: McMillan Co.
- Bell, A. (2001). The pedagogical potential of school grounds. In T. Grant & G. Littlejohn, (Eds.), *Greening School Grounds: Creating Habitats for Learning*. New York: New Society Publishers.
- California State Department of Education, Office of Environmental Education (2000). California student assessment project—the effects of environment based education on student achievement. Sacramento: State Department of Education.
- Canaris, I. (1995). Growing foods for growing minds: Integrating gardening and nutrition education into the total curriculum. *Children's Environments*, 12(2), 264–270.
- Capra, F. (1997). *Web of life*. New York: Double Day.
- Carver, R. (1998). *Education for all: From experience, through guidance and reflection*. Doctoral dissertation, Stanford University, Division of Education, Stanford, CA.
- Center for Ecoliteracy & Life Lab Science Program (1997). *Getting started*. Berkeley, CA: Center for Ecoliteracy.
- Cheskey, E. (2001). How schoolyards influence behavior. In T. Grant & G. Littlejohn, (Eds.), *Greening School Grounds: Creating Habitats for Learning*. New York: New Society Publishers.
- Cobb, E. (1969). The ecology of imagination in childhood. In P. Shepard & D. McKinley, (Eds.), *The Subversive Science: Essays Toward an Ecology of Man*. Boston: Houghton Mifflin.
- Coffey, A. (2001) Transforming school grounds. In T. Grant & G. Littlejohn, (Eds.), *Greening school grounds: Creating habitats for learning*. New York: New Society Publishers.
- Comenius, J. A. (1592–1670). *The school of infancy*. Edited with an introd. by Ernest M. Eller. Chapel Hill: University of North Carolina Press.
- Desmond, D., Grieshop, J. & Subramaniam, A. (in press). Revisiting garden-based learning in basic education. Paris, France: International Institute for Educational Planning (IIEP).
- Dewey, J. (1915). *Schools of tomorrow*. New York: E. P. Dutton.
- Disinger, J. et al. (1994). *Defining environmental education*. Workshop Resource Manual. Report ISBN 1-884782-03-5. Ann Arbor: University of Michigan.
- Drake, S. M. (1998). *Creating integrated curriculum*. Thousand Oaks, CA: Corwin Press.

- Eames-Sheavly, M. M. (1999). *Sowing the seeds of success*. Vermont: National Gardening Association.
- Froebel, J. F. (1998). *The education of man*. Retrieved January 20, 2002, from <http://members.tripod.com/~FroebelWeb/web7000.html>
- Gardner, H. (1993). *Frames of mind*. New York: Basic Books.
- Gardner, H. (1999). *Intelligence reframed*. New York: Basic Books.
- Goleman, D. (1995). *Emotional intelligence: Why it can matter more than IQ*. New York: Bantam Books.
- Greene, M. L. (1910). *Among school gardens*. New York: Russell Sage.
- Hart, R. (1997). *Children's participation*. New York: UNICEF
- Hendren, K. (1999). Evaluation of master gardeners' classroom garden project on youth living in low-income, inner-city neighborhoods of San Antonio (Texas). Dissertation submitted to the Department of Humanities and Social Sciences, Lady of the Lake University.
- Horst, S., Morna, C. L., & Jonah, D. O. (1995). Educating our children to be farmers. *Children's Environments*, 12(2), 192–196.
- Iozzi, L. & Marcinkowski, T. (1990) Assessment of learning outcomes in environmental education. In M. Maldague (Ed.), *Methods and techniques for evaluating environmental education*. Paris: UNESCO.
- Kaiser, M. (1976). Alternative to therapy: Garden program. *Journal of Clinical Child Psychology*, 5(2), 21-24.
- Katz, L. (1990) Impressions of Reggio Emilia preschools. *Young Children*. 45(6).
- Learning through landscapes. The UK School Ground Charity. Retrieved January 12, 2002, from <http://www.ltl.org.uk/>
- Lieberman, G. A. & Hoody, L. (1998). Closing the achievement gap: Using the environment as an integrating context for learning. San Diego: State Education and Environment Roundtable.
- Lineberger, S. E. & Zajicek, J. M. (2000). School gardens: Can a hands-on teaching tool affect students attitudes and behaviors regarding fruit and vegetables? *Hortechology*, 10(3), 593–597.
- Marturano, A. (1999). The educational roots of garden-based instruction and contemporary gateways to gardening with children. *Kindergarten education: Theory, research, and practise* 4(1), 55–70.
- Meyer, E. (1997). Cultivating change: A historical overview of the school garden movement. Unpublished paper from graduate seminar on Social and Cultural Studies in Education, University of California, Davis.
- Montessori, M. (1912). *The absorbent mind*. Translated from the Italian by Claude A. Claremont. New York: Dell Pub. Co.
- Moore, R. C. (1995). Children gardening: First steps toward a sustainable future. *Children's Environments*, 12(2).

- Morris, J. , Briggs, M, & Zidenberg-Cherr, S. (2000). School-based gardens can teach kids healthier eating habits. *California Agriculture*. September/October.
- News_Carrots (1999). *UCDavis Magazine*. Retrieved January 20, 1999, from http://www-ucdmag.ucdavis.edu/su99/News_Carrots.html
- North American Montessori Teachers Association (1998). Maria Montessori: A brief biography. Retrieved January 10, 2002, from <http://www.montessorinamta.org/generalinfo/biog.html>
- Orr, D. W. (1992). *Ecological literacy*. New York: State University of New York Press.
- Orr, D. W. (1994). *Earth in mind*. Washington, DC: Island Press.
- Patton, M. Q. (1997). *Utilization focused evaluation*. Thousand Oaks, CA: SAGE Publications.
- Pivnick, J. (1994). Sowing a school garden: Reaping an environmental ethic. In T. Grant & G. Littlejohn, (Eds.), *Greening school grounds: Creating habitats for learning*. New York: New Society Publishers.
- Rilla, E. & Desmond, D. J. (2000). *Connecting children to the land: A review of programs in agricultural literacy in California*. Oakland: University of California, Division of Agriculture and Natural Resources.
- Rilla, E., et al. (1995). *Agricultural education feasibility at Walker Creek Ranch*. Oakland: University of California, Division of Agriculture and Natural Resources.
- Sealy, M. R. (2001). A garden for children at Family Road Care Center. Unpublished master's thesis. Graduate faculty of Louisiana State University and Agricultural Mechanical College: School of Landscape Architecture.
- Skelly, S. M. & Zajicek, J. M. (1998). The effect of an interdisciplinary garden program in the environmental attitudes of elementary school students. *Horttechnology*, 8(4),579–583.
- Tuan, Y. (1978). Children and the natural environment. In I. Altman & J. F Wohlwill, (Eds.), *Children and the Environment*. New York: Plenum Press.
- Weatherford, E. & Weatherford, C. G. (1987). A review of theory and research found in selected experiential education, life skill development, and 4-H program impacts literature. Printed through the resources of North Carolina State University, Extension Service and the National 4-H Council.
- Weed, C. M. & Emerson, P. (1909). *School garden book*. New York: Charles Scribner's Sons.
- Williamson, R. & Smoak, E. (1999). Creating a down-to-earth approach to teaching science, Math, and Technology. *Journal of Extension*. 37(3).
- Yamamoto, B. T. (2000). But who's going to water? Complexity and thick explanation on a critical ethnographic study of two school garden projects. Unpublished master's thesis, Department of Human and Community Development, University of California, Davis: Division of Graduate Studies.

Previous Monograph Topics

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