Improving student health through horticultural therapy and school garden establishment

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Abstract

In Taiwan, elementary schools that include alternative programs as plant care are seldom and participating in horticultural activities is not encouraged. Horticultural therapy (HT) uses plants and horticultural activities to promote well-being by improving psychophysiological health. This investigation applied horticultural therapy theory to design a “Green Kid Club” activity and establish a garden at Yang-Ming Shan elementary school in Taipei. The horticultural activities created a healthier school campus and the “Green Kid Club” bought numerous benefits for participating students. Twenty-three students ranging from 9 to 12 years of age (grade third to sixth grades) were recruited to participate in the study during the fall semester of 2003. The results of this investigation indicated that school horticultural therapy program displayed positively affected child learning, and moreover the children involved made healthier food choices, and achieved better psychophysiological growth. Moreover, this work demonstrated that simple exposure to a food helps improve child perceptions of that food. Significant differences also were found between the pre-test and post-test scores in terms of improving horticultural knowledge and skills, environmental recognition, and creativity after completing the horticultural activity program. The results of this study revealed enormous potential for improving child learning and health through horticultural activities and school garden establishment.

Key words: Horticultural therapy, school garden, Green Kid Club

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Introduction

Horticultural Therapy (HT) uses plants and horticultural activities to promote well-being by enhancing individual psychophysiological health (Davis, 1995; Ulrich and Parsons, 1992). Adapted tools, materials, and specially designed gardens help promote effective therapy (Catlin, 1995; Haller, 1995). Effective HT program planning requires a good understanding of the individual goals and objectives of participants (Davis, 1995; Flagler, 1992). Unfortunately, most Taiwanese youth have limited interaction with nature.

Horticultural therapy is a process using plants and horticultural activities to improve the social, educational, psychological and physical benefits of trained clients. It has also proven to be beneficial for younger kids (Kavanagh, 1995). Plants provide a positive physical surrounding where it provides more comfortable to live and work. The three primary interactive qualities of horticultural plants can be categorized as sensory, functional, and responsive relationship. Using plants to stimulate five senses provide a good therapeutic program for those disabled people (Relf, 1995). The application of horticulture activities including sexual and vegetative propagation and floral design were demonstrated. School gardens were first developed in the early 1900s. These gardens allowed students to study nature, learn work habits and develop socially (Beech et al., 1999). School gardens enrich child education and can stimulate their interest in various ways (Shannon et al., 1981). Particularly, school gardens can educate children about food (Baxter et al., 2001). Children tend to favor sweets and salty snacks over vegetables and fruits (Nobel et al., 2000). Parents thus generally should encourage their children to eat more raw vegetables while maintaining a normal diet of fruits, grains, and protein rich foods. Many works have demonstrated that students become extremely interested in nutrition if they are given the opportunity to grow their own produce from seed, nurture it, and finally consume it straight from the garden (Lineberger, 1999).

Although HT is used by health care facilities, community agencies, schools, nursing homes, correctional facilities, and vocational programs all over the world, little information is available on horticultural therapy and its application to children in Taiwan. This study thus assessed the effect of gardening on horticultural skills, nutritional attitudes, and related behaviors of Taiwanese children.

Materials and Methods

The study design involved three horticultural activities for the participating children including (1) *training* the horticultural skills and improving the horticultural knowledge, including plant propagation, vegetable cultivation, (2) vegetable cultivation and salad making for improving nutritional attitude, and (3) school garden establishment, for improving environmental recognition and psychophysiological health. Twenty three students ranging from 9 to 12 years of age (grades three to six) from Yang-Ming Shan elementary school in Taipei, a city where the green space are few for children, were recruited to participate in the study during the fall semester of 2003. Specifically, the students engaged in a “Green Kids Club” activity in an outdoor horticultural garden or an indoor classroom every other Tuesday morning between eight thirty and ten p.m. for 8 weeks. Depending on horticultural training program and various objectives, students needed to complete a pre-test before the class began, and then completed post-test involving survey questionnaires at the end of the individual designed horticultural program. Table 1 lists the therapeutic objectives and horticultural activities used in this investigation. Students also needed to help school garden establishment at the end of regular class each time. School garden was designed before the class began. The design principles of school garden which was developed by Texas A&M University were refereed in our study (http://aggie-horticulture.tamu.edu/kindergarden/Child/school/sgintro.htm). Collecting data was analyzed using two methods, namely descriptive statistics and one-way ANOVA, using Statistix 8 (Analytical Software, FL).

Results and Discussion

The school garden design works were completed before the program began. Participating students were helping school garden construction with instructors at the end of regular class, and then students were signed to maintain the gardens (fig. 1). After 8 weeks of HT activities, the HT program brought benefits in terms of improved horticultural skills, nutritional attitudes and creativities. Through the responses of students on the benefits of horticultural knowledge and skills before and after the horticulture program following 8 weeks of activities, we found that there were statistically significant differences on increasing favor of gardening, and knowing what vegetative propagation, and shoot cutting were (Table 2). After labeling their owned pots of seeding and cuttings, students were encouraged to closely observe their plants, and also were responsible for watering, and caring for their personal plants (Fig. 2). Although there were no statistically significant differences, participants who completed the horticultural activity program displayed an improvement in their horticultural skills (Table 2). In horticultural program design, it is important to create opportunity for children to learn something about nature, and this could be done by plant propagation and then labeling plants to learn their name.

Table 3 showed that the nutritional activity bring benefits to their nutritional behavior that a salad was even more delicious if grown the vegetables planting by themselves, although no statistically significant different (Table 3). The positive results were found on improvement of their knowledge on what aromatherapy and organic cropping were. In this activity, the students learned how to cultivate vegetables, perform companion planting using herbs, and using vegetables to make salad (Fig.3). In the salad making activity, the teacher provided various recipe ideas for salads, and each group then was asked to create their own salad (Fig. 4). The school gardening activity achieved positive results. Accordingly, the survey apparently demonstrated that simple exposure to a food increases liking.

The analytical results presented above demonstrate that the school based HT program displayed very positively impacted child learning and growth. Urban children shoukd have the opportunity to escape from noise and unhealthy environment and to learn about nature. All the schools in Taiwan should be taking into consideration the psychophysiological value of garden before built. This study has provided some positive results that the school garden works as an open laboratory and as a good space of an urban ecological school to favor sustainability. Although this study had a short-term focus, based on the findings we expect that HY programs and the establishment of school gardens can achieve long-term benefits for all children, regardless of cultural background. The study is also to propose a solution for elementary school that could stimulate a multi-disciplinary approach to fill the lack of creativity of children in Taiwan.

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References

1. Baxter, S.D., W.O. Thompson, and H.C. Davis. 2001. Trading of food during school lunch by first- and fourth-grade children. Nutrition Research 21:499-503.
2. Beech, B.M., R. Rice, L. Myers, C. Johnson, and T.A. Nicolas. 1999. Knowledge, attitudes, and practices related to fruit and vegetable consumption of high school students. J. Adolescent Health 24:244-250.
3. Catlin, P. 1995. Developmental disabilities and horticultural therapy practice. P.131-156. *In*: Horticulture as Therapy-Principles and Practice. Ed: Simson, S.P., and M.C. Straus. Haworth Press, NY.
4. Davis, S.H. 1995. Development of the profession of horticultural therapy. P.3-20. *In*: Horticulture as Therapy-Principles and Practice. Ed: Simson, S.P., and M.C. Straus. Haworth Press, NY.
5. Davis, S.H.1995. A study in horticultural therapy: Matt's seed story. HortTechnology 5(2):115-117.
6. Flagler, J.S. 1992. Master gardeners and horticultural therapy. HortTechnology. 2(2):249-250.
7. Haller, R. 1995. Vocational, social, and therapeutic program in horticulture. P.43-70. *In*: Horticulture as Therapy-Principles and Practice. Ed: Simson, S.P., and M.C. Straus. Haworth Press, NY.
8. Http://aggie-horticulture.tamu.edu/ kindergarden/Child/school/sgintro.htm
9. Kavanagh.J.S.1995.Therapeutic landscapes: gardens for Horticultural therapy coming of age. HortTechnology 5(2): 104-107.
10. Lechner, L., and J. Brug. 1997. Consumption of fruit and vegetables: how to motivate the population to change their behavior. Cancer Letters 114:335-336.
11. Lineberger, S. E. 1999. The effect of school gardens on children's attitudes and related behaviors regarding fruits and vegetables. http://aggie-horticulture.tamu. edu/humanissues/sarahl.html.
12. Nobel, C., M. Coney, A. Eves, M. Kipps, and M. Lumbers. 2000. Food choice and school meals: primary schoolchildren's perceptions of the healthiness of foods and the nutritional implications of food choices. Hospitality Management 19:413-432. Nutrition

research 16:591-601

13. Relf, P.D. 1995. People-plant relationship. P.21-42. *In*: Horticluture as Therapy-Principles and Practice. Ed:Simson, S.P., and M.C. Straus. Haworth Press, NY.
14. Shannon, B., K. Graves, and M. Hart. 1981. Food behavior of elementary school students after receiving nutrition education. J. American Diet Association 81:428-434.
15. Ulrich, R.S., and R. Parsons. 1992. Influences of passive experiences with plants on individual well-being and health. In P. D. Relf (ed.), The Role of Horticulture in Human Well-Being and Social Development: A National Symposium. Portland, OR: Timber Press.

Table 1. Therapeutic objectives and the horticultural activities used in this study

Horticultural therapy objective	Horticultural activity	Setting and duration	Materials	Procedure
Develop horticultural knowledge and skills	Propagation activities	The activities were held in a classroom over a two week period.	Seeds of summer annual flower, and pots of Devil's ivy (*Epipremnum aureum var. capitata*)	• Students start new plants via sexual plant propaga- tion using seeds (of various species and varieties) and also by asexual propagation techniques of stem and leaf cutting.
1.Develop planting skills 2.Develop nutritional attitudes	1. Vegetable growing 2. Salad making	The vegetable cultivation was carried out in the designed school garden; meanwhile, the salad making was done in a classroom. In the vegetable cultivation activity, the students learned how to cultivate vegetables since second week to last week of the program.	Cabbage (*Brassica oleracea*) seedlings were used for vegetable growing, while the salad making included *Daucas carota*、*Brassica oleracea var. capitata* 、*Brassica oleracea var.italica*、*Lycopersicon esculentum* 、*Cucumis melo* 、*Cucumis Sativus*、*Actinidia deliciosa.*	• In the vegetable growing activity, the teacher introduced the benefits of eating vegetables and some basic information regarding vegetables, students then was asked to plant their own vegetable seedlings in an assigned vegetable growing bed in the school garden. • After labeling their seedlings, students were responsible for watering, and caring for their personal plants. • In the salad making activity, the teacher provided various recipe ideas for salads, and each group then was asked to create their own salad.
1. Develop creativity and planning skills	Planting design	The activities were held in an assigned flower bed and in an open space in	*Cosmos bipinnatus* Cav (five)、*Duranta repens* L. (six)、	• A leader was selected for each group. • The teacher provided basic information on planting design.

2. Develop group communication and interaction 3. Develop pride and ownership		the school garden over a two week period. Plant video watch	***Celosia cristata* Linn.** (five)、*Dianthus chinensis* (five) 、*Dahlia hybrida* Hort (five)、、and artificial butterflies (two)。	• Each group attempted to determine a design topic. • Assistants encouraged students to work together and developed individual designs. • After planting, each group was asked to take a picture with your design work, and give oral presentations to the teacher regarding the meaning of their design work. • Students were responsible for watering, and caring for their plants.

Table 2. Responses of students on the benefits of horticultural knowledge and skills before and after the horticulture program following 8 weeks of activities.

Statement	Pre/Post test	No. of response	Mean	Min	Max	Std. Devia.	C.V.
Did you like gardening	pre	22	2.73 a[†]	1.00 [‡]	5.00	1.33	37.20
	post	19	4.26 a	3.00	5.00	1.50	20.45
	total	41	4.00	1.00	5.00	1.45	30.02
Did you know what	pre	22	2.64 a	1.00	5.00	1.32	50.41
vegetative propagation is	post	22	3.41 a	1.00	5.00	1.50	44.03
	total	44	3.02	1.00	5.00	1.45	48.12
Did you know what	pre	22	3.00 a	1.00	5.00	1.45	48.25
leaf cutting is ?	post	22	3.41 a	1.00	5.00	1.47	43.01
	total	44	3.02	1.00	5.00	1.46	45.44
Did you know what	pre	22	2.77 a	1.00	5.00	1.54	55.57
tilling is ?	post	22	3.14 a	1.00	5.00	1.36	43.22
	total	44	2.95	1.00	5.00	1.45	48.94
Did you know what	pre	21	2.67 a	1.00	5.00	1.43	53.47
shoot cutting is ?	post	21	3.33 b	1.00	5.00	1.49	44.83
	total	42	3.00	1.00	5.00	1.48	49.39
Did you improve your	pre	23	2.78 a	1.00	5.00	1.17	41.91
horticultural skills	post	22	3.14 a	1.00	5.00	1.21	38.48
	total	45	2.96	1.00	5.00	1.19	40.14

[†] Means followed by different letters are significantly different at the 0.05 probability level

[‡] 5= strongly agree, 4= agree, 3= neutral, 2= disagree, 1= strongly disagree

Table 3. Responses of students on the benefits of nutritional attitude, environmental recognition, and psychological health before and after the horticulture program following 8 weeks of activities.

Statement	Pre/Post test	No. of response	Mean	Min	Max	Std. Devia.	C.V.
I would feel that a salad	pre	18	3.56 a[†]	1.00 [‡]	5.00	1.38	38.85
was even more delicious	post	20	3.70 a	1.00	5.00	1.26	34.07
if I had grown the vegetables	total	38	3.63	1.00	5.00	1.30	35.89
used to make it myself ?							
Did you know what	pre	20	3.05 a	1.00	5.00	1.47	48.13
organic cropping is ?	post	15	3.20 a	1.00	5.00	1.52	47.54
	total	35	3.11	1.00	5.00	1.47	47.23
Did you know what	pre	15	2.93 a	1.00	5.00	1.58	48.25
aromotherapy is ?	post	16	3.25 a	1.00	5.00	1.81	43.01
	total	31	3.10	1.00	5.00	1.63	45.44
Did you know the	pre	14	2.07 a	1.00	5.00	1.77	85.66
benefits of	post	15	3.00 a	1.00	5.00	1.65	54.91
aromatherapy is ?	total	29	2.55	1.00	5.00	1.74	68.35
Did you enjoy your	pre	22	3.68 a	1.00	5.00	1.36	36.91
“Nature” course?	post	22	3.86 b	1.00	5.00	1.45	37.72
	total	44	3.77	1.00	5.00	1.40	37.00
Did you think gardening	pre	22	3.77 a	1.00	5.00	1.27	33.66
help you more understanding	post	19	4.52 b	1.00	5.00	0.61	13.52
the environmental issue?	total	41	4.12	1.00	5.00	1.08	26.13
Did you think your school	pre	22	3.59 a	1.00	5.00	1.18	32.90
need more green spaces?	post	19	4.05 a	1.00	5.00	0.78	19.24
	total	41	3.80	1.00	5.00	1.03	27.07
Did garden design work	pre	23	2.74 a	1.00	5.00	1.32	48.26
stimulate your imagination?	post	22	4.53 b	1.00	5.00	1.10	31.48
	total	45	4.12	1.00	5.00	1.27	40.67
Were you satisfied with	pre	19	3.79 a	1.00	5.00	1.27	33.59
your design work and did	post	18	3.83 b	1.00	5.00	1.29	33.78
you feel successful	total	37	3.81	1.00	5.00	1.28	33.21

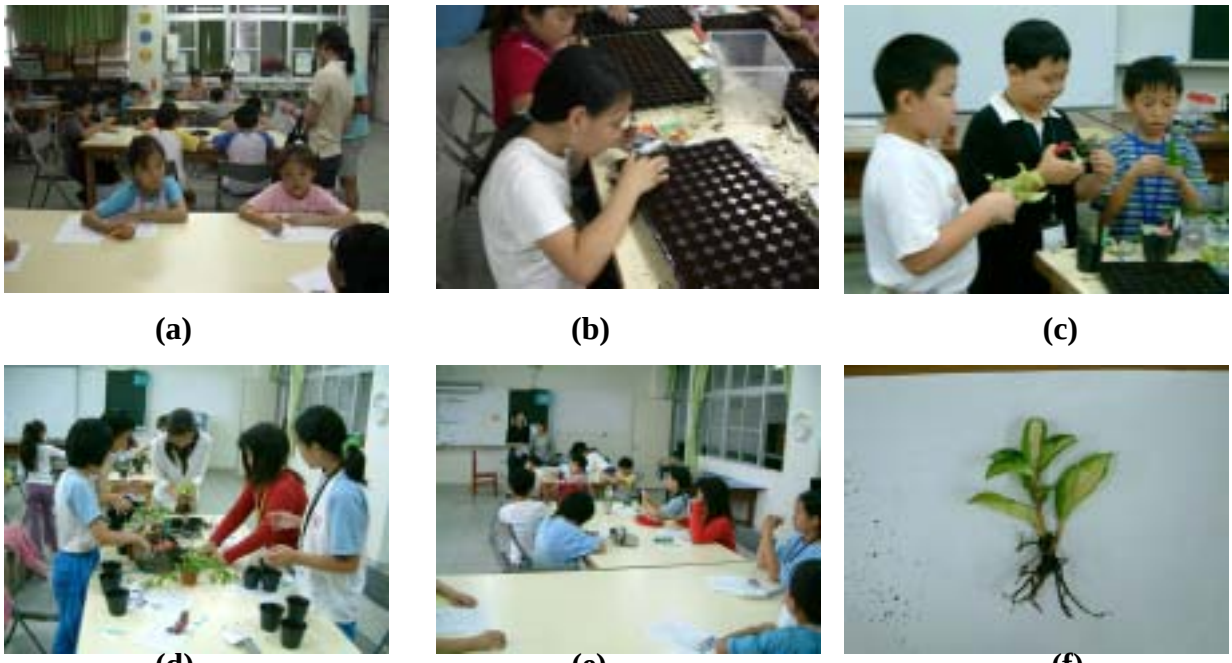
[†] Means followed by different letters are significantly different at the 0.05 probability level

[‡] 5= strongly agree, 4= agree, 3= neutral, 2= disagree, 1= strongly disagree

(a) **(b)** **(c)**

(d) **(e)** **(f)**

Fig. 1. Design of the school garden (a) master plan (b) main entrance (c) vegetable beds (d) establishing the fence (e) digging a hole (f) completing part of works



(a) (b) (c)

(d) (e) (f)

Fig. 2. Pictures of the "Green Kids" completing assigned work during the horticultural therapy activities (a) pre-testing (b) seeding (c) cutting plant organs(d) cutting propagation (e) labeling (f) regenerated plant cutting after 2 month

(a) **(b)** **(c)**

Fig. 3. The “Green Kids” were planting and watering vegetables with their own hands in the school garden and proud of their works. (a) seedling planting (b) watering (c) achieving success in the garden

(a) **(b)** **(c)**

Fig. 4. Photographs of the “Green Kids” making salad during the nutritional attitude activities (a) learning how to make salad (b) teamwork (c) proud of their work

Fig. 5. Steps involved in the HT design activity, from selecting a leader through to completing the design work (a) choosing a leader (b) discussions with the teacher (c) group thinking (d) trying to arrange plants (e) deciding a design topic (f) digging the plants in(g) teamwork (h) completing assigned work

運用景觀園藝治療方法促進國小學童生心理之健康

郭毓仁

摘要

台灣在過去甚至現今的國小教育中造就了國人體質的劣化，這可以從學童有越來越多的胖子出現以及越來越多的幼兒視力退化的情形顯現出來。這種現象除了因為升學壓力所造成之外，飲食的不均衡以及綠地的缺乏有極大的關聯。在過去，地球上的人生活的很單純（simple），生活的目標就是生存。自然擁有不可知的力量，人類融入大自然中生活，家庭是生產者，和土地有密不可分的關係，生存是生命最終的目標。可惜現代的社會，人類變成消費者，人類有足以破壞其他生命的潛能，生存不是生命的目標。取代的是族群的認可，兒童的教育，以及所觀察到的生命是被父母或專家所設計好的，小孩把大部分的時間用在電視娛樂。「景觀治療」是藉由景觀元素所組成的環境來作為刺激感官的工具，也可以說是以外在的環境來當作治療的工具。園藝治療乃是一種經由接觸植物、藉由庭園的活動、以及接近自然的心所產生的感覺，來得到治療與復育。美國曾經有報告指出，在國小課程中加入園藝實習課程讓同學親自栽種蔬菜果樹，藉由自己栽種收成的作物並從中教導如何烹飪及告知均衡飲食的觀念可以大大提高學童吃蔬菜的慾望。反觀國內在這方面的統計資料，追蹤，以及實際操作極不落實。

本研究主要是以景觀園藝治療理論為原則，利用建立校園庭園(school garden)的機會以”園藝快樂成長營”的社團方式於校園中種植蔬菜園藝等。對象為陽明山國小 3~6 年級的學童共 23 名以每隔週二早上 1 個小時的社團時間實行。經過 8 次的課程後，結果發現參與社團的學童在園藝技巧、環境認知、創造力、及對飲食均衡的態度都有進步。本研究結果證實藉由校園庭園的建立及園藝課程的安排對學童的確有生心理的助益。而研究之設計亦可提供台灣教育改革方式之參考。

關鍵詞:景觀及園藝治療， 綠地缺乏，校園庭園

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