on the production, grape and wine quality of 'Shiraz' vines in the Murrumbidgee irrigation area. *Austral. J. Expt. Agr.* 26:511-516.

Howell, G.S. 1987. *Vitis* rootstocks, p. 451-472. In: R.C. Rom and R.F. Carlson (eds.). *Rootstocks for fruit crops*. Wiley, New York.

Kelley, C.C. and R.H. Spilsbury. 1949. Soil survey of the Okanagan and Similkameen Valleys, British Columbia. B.C. Survey, Victoria, Dept. Agr. Rpt. 3.

Mattick, L.R. 1983. A method for the extraction of grape berries used in total acid, potassium, and individual acid analysis. *Amer. J. Enol. Viticult.* 34:49.

McAuley, M. and M.C. Vasconcelos. 2000. Physiological responses and fruit composition of Pinot noir on 20 rootstocks. 50th Annu. Mtg., Amer. Soc. Enol. Viticult., 19-23 June, Seattle, Wash. (abst.).

Pongracz, D.P. 1983. Rootstocks for grapevines. David Philip, Cape Town, S. Afr.

Pool, R.M., G.E. Howard, R.M. Dunst, W.G. Smith, and A.M. Wise. 1992. Rootstock research for the northeast United States, p. 69-75. In: J.A. Wolpert, M.A. Walker, and E. Weber (eds.). *Proceedings of Rootstock Seminar: A Worldwide Perspective*. Amer. Soc. Enol. Viticult., Davis, Calif.

Reynolds, A.G. and R.M. Pool. 1980. Root distribution in relation to growth and yield of 'Delaware' grapes. *Proc. N.Y. State Hort. Soc.* 127:35-46.

Reynolds, A.G. and D.A. Wardle. 1995. Performance of "Gewurztraminer" (*Vitis vinifera* L.) on three root systems. *Fruit Var. J.* 49:31-33.

Ruhl, E.H. 1989a. Effect of potassium and nitrogen supply on the distribution of minerals and organic acids and the composition of grape juice of Sultana vines. *Austral. J. Expt. Agr.* 29:133-137.

Ruhl, E.H. 1989b. Uptake and distribution of potassium by grapevine rootstocks and its implication for grape juice pH of

scion varieties. *Austral. J. Expt. Agr.* 29:707-712.

Ruhl, E.H. 1991. Effect of potassium supply on cation uptake and distribution in grafted *Vitis champinii* and *Vitis berlandieri* x *Vitis rupestris* rootstocks. *Austral. J. Expt. Agr.* 31:687-691.

Ruhl, E.H. 1992. Effect of K supply and relative humidity on ion uptake and distribution on two grapevine rootstock varieties. *Vitis* 31:23-33.

Ruhl, E.H., P.R. Clingeleffer, P.R. Nicholas, R.M. Crami, M.G. McCarthy, and J.R. Whiting. 1988. Effect of rootstocks on berry weight and pH, mineral content, and organic acid concentrations of grape juice of some wine varieties. *Austral. J. Expt. Agr.* 28:119-125.

Shaulis, N.J. and R.G.D. Steele. 1969. The interaction of resistant rootstock to the nitrogen, weed control, pruning and thinning effects on the productivity of Concord grapevines. *J. Amer. Soc. Hort. Sci.* 94:422-429.

Smart, R.E. 1991. Canopy microclimate implications for nitrogen effects on yield and quality, p. 90-101. In: J.M. Rantz (ed.). *Proc. Int. Symp. on Nitrogen in Grapes and Wine*, Amer. Soc. Enol. Viticult., Davis, Calif.

Striegler, R.K., and G.S. Howell. 1991. The influence of rootstock on the cold hardiness of Seyval grapevines. I. Primary and secondary effects on growth, canopy development, yield, fruit quality and cold hardiness. *Vitis* 30:1-10.

Valat, C., M. Valadier, R. Pouget, and M. Ottenwaelter. 1988. Comportement de porte-greffes résistants à la chlorose dans le vignoble de Tavel: Résultats de 9 années d'expérimentation. *Progrès Agricole et Viticole* 105:407-410.

Wolpert, J.A. 1992. Rootstock use in California: History and future prospects, p. 52-9. In: J.A. Wolpert, M.A. Walker, and E. Weber (eds.). *Proceedings of Rootstock Seminar: A Worldwide Perspective*. Amer. Soc. Enol. Viticult., Davis, Calif.

A Profile of Juvenile Offenders in a Vocational Horticulture Curriculum

Catherine McGuinn¹ and
Paula Diane Relf²

ADDITIONAL INDEX WORDS. horticultural therapy, youth at risk, human issues in horticulture, juvenile delinquent, probation

SUMMARY. This study provides a profile of six juvenile offenders' responses to a vocational horticulture curriculum. The results indicate that vocational horticulture curricula may be a tool to strengthen a delinquent individual's bonds with society and, subsequently, evoke changes in attitudes about personal success and perceptions of personal job preparedness. The youths in this study increased their social bonds in all six categories addressed by the pretest and posttests, and were motivated to think more practically about their careers. Due to the limitations on size and scope of the study, it is exploratory in nature and provides ideas for future research and possible assessment methods for further research.

The average juvenile offender is either incarcerated in a county juvenile hall, thus exposed to severe forms of deviant behavior from peers, or is released to the streets with little, if any, skills to succeed in the community. These youths must be educated in creative ways to meet their unique needs and to help deter unlawful tendencies. To label youths as deviant and incarcerate

The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper therefore must be hereby marked *advertisement* solely to indicate this fact.

¹Graduate student, Department of Horticulture, Virginia Polytechnic Institute and State University, 407 Saunders Hall, Blacksburg, VA 24061-0327.

²Professor, Department of Horticulture, Virginia Polytechnic Institute and State University, 407 Saunders Hall, Blacksburg, VA 24061-0327.

them does nothing to solve the root problem, and it can even make the problem worse (Heeren and Shichor, 1990). Providing a positive employment opportunity in an atmosphere of support can be “the single most important buffer against repeated crime” (Nelson, 1977).

An individual's bond with society can be a motivating force toward conforming behavior. Social bonding theory (Hirschi, 1969) maintains that delinquency occurs as a result of an individual's deteriorating bond with society. Although many factors can affect an individual's bonds with society, the more an individual is obligated to interact with society and therefore experience positive social pressure, the greater chance that individual has of

developing strong social bonds.

Horticultural programs have been observed to reduce aggressiveness of institutionalized adolescents (Cotten, 1975), and appear to reduce recidivism among juvenile offenders, as seen in the Green Brigade program in San Antonio, Texas (Finch, 1995). In an earlier project, it was observed that horticultural programs for juvenile offenders can provide “important job training and instill regular work habits and behaviors” before these youths reach adulthood, and “participants can learn to tolerate frustration and manage impulsive and negative behavioral responses” which can lead to further deviant behavior (Flagler, 1995). “As self-evaluation surveys indicate, incarcerated youths often feel that nothing they do ever

turns out right,” but in a horticultural program, “participants can be (and are) taught to plan, work appropriately” and succeed (Flagler, 1995). Horticulture is increasingly becoming a part of rehabilitation in the corrections industry. According to Rice and Remy (1994), the success of programs like The Garden Project operated by the San Francisco Sheriff's Department help to substantiate the idea that socially deviant individuals need to be lead back into society in a positive way and offered the opportunity to reconnect with their community. Some programs teach skills which prepare the youths to apply for jobs and assist in job placement, with some form of career counseling, internships, or job placement to help serve as follow-up and steer the program graduates to-

Table 1. Outline of the weekly horticulture curriculum conducted by the author and student mentors at the Alternative Education Program Project School (AEPPS).

Module	Content
1	About the career
13 Feb.	Students will take pretests, sign consent forms, and receive an introduction to the curriculum. A professor of a 2-year agricultural technology program will talk about greenhouse management. Students will be divided into three rotating groups: one to clean greenhouse, one to discuss plant care, and one to make cuttings.
20 Feb.	Students will meet at Virginia Tech greenhouses and gardens. The greenhouse manager will talk about his career. Students will tour the greenhouses and gardens.
27 Feb.	The grounds manager at Virginia Tech will talk about Virginia Tech's grounds and grounds workers, discuss job forms, tools of the trade, safety, interview skills, and the career of horticulture.
2	Skills
3 Mar.	A Master Gardener volunteer will demonstrate composting and discuss benefits and uses of compost. Also, a landscape design student will demonstrate garden design. Students will divide into two rotating groups: one group will design a garden for the Compost Demonstration Garden Site and the other will build a composting site at the school.
13 Mar.	Students will meet at Nellie's Cave Arboretum for a pruning demonstration. The author will discuss different cuts, how and why to prune, and safety. Everyone will prune trees or shrubs.
23 Mar.	Students will work in the greenhouse. Students will divide into three groups: one to repot cuttings, one to repot new plants, and one to do greenhouse chores.
27 Mar.	A local general contractor will demonstrate how to build benches for the greenhouse. Everyone will participate in design and construction of benches.
3	Building a garden
3 Apr.	Students will tour two landscape sites. A local landscaper will talk about landscape installation and care, the nature of the work, and the skills required. Everyone will work on landscape site installation and maintenance.
8 Apr.	An urban forestry graduate student will demonstrate proper tree planting at the AEPPS. Students will divide into three groups, each one planting one tree.
17 Apr.	Students will plant a wildflower meadow at Nellie's Cave Arboretum. Everyone will turn the soil and plant seeds. The students will then visit the personnel office at Virginia Tech to look at the job board.
22 Apr.	Students will install the AEPPS's landscape. Three groups of students will plant bulbs at the school and install landscape plants.
4	Completing projects; planting and plant sale
1 May	Students will have interviews with a town horticulturist for two internship positions.
8 May	Students will work at the Virginia Tech spring plant sale.
15 May	Students will meet at the Compost Demonstration Site Garden at the Blacksburg Recreation Center to install the flower garden. Each group will be designated a area to work in.
22 May	Students will meet at the Compost Demonstration Site Garden to water, mulch, and do general planting maintenance. Each group will maintain their designated area (i.e. water, weed, etc).
29 May	Students will build a raised bed for the school's future horticultural projects, maintain the AEPPS landscape, and complete posttests.
5 June	Author and mentors will wrap up the project, give out certificates, and celebrate with students!

Table 2. Social bond pretest and posttest results for the six students in the Alternative Education Program Project School (AEPPS) assessing students' opinions about school, teachers, peers, self, and environmental attitudes, developed from Hirshi's tests of social bond for juvenile delinquency (Hirshi, 1969).

AEPPS section	Results ^z	
	Pretest	Posttest
I: SCHOOL		
1) In general, do you like or dislike school? (Like it/Dislike it)	2	4
2) How important do you think what you learn in school is to getting a job? (A lot/A little)	3	3
3) How important do you think grades are for getting the kind of job you want when you finish school? (Important/Unimportant)	4	6
4) Do you agree with the statement, "The things I do in school seem worthwhile and meaningful to me." (Agree/Disagree)	4	5
II: TEACHERS		
5) Do you care what teachers think of you? (I care a lot/I don't care much)	2	5
6) Do you agree with the statement, "Most teachers enjoy teaching." (Agree/Disagree)	6	5
7) Do you agree with the statement, "Teachers teach me information that is relevant to my life." (Agree/Disagree)	5	6
8) Do you agree with the statement, "I share my thoughts and feelings with my teachers." (Agree/Disagree)	2	5
9) Would you like to be the kind of person your teachers are? (Yes/No)	1	4
III: PEERS		
10) Do you agree with the statement, "My friends respect other people." (Agree/Disagree)	5	5
11) Would you like to be the kind of person your friends are? (Yes/No)	2	2
12) Do you care what your friends think of you? (Yes/No)	3	4
13) Do you agree with the statement, "I share my thoughts and feelings with my friends." (Agree/Disagree)	4	5
14) How much influence do your friends have on your decisions? (A Little/A Lot)	1	1
IV: OPINIONS OF SELF		
15) Do you agree with the statement, "What is going to happen to me will happen, no matter what I do." (Agree/Disagree)	3	3
16) Do you agree with the statement, "I would rather not start something at which I may not be successful." (Agree/Disagree)	4	2
17) Do you agree with the statement, "I should not expect too much out of life." (Agree/Disagree)	1	0
18) Do you agree with the statement, "I do not have much to be proud of." (Agree/Disagree)	0	1
19) Do you agree with the statement, "On a whole, I am satisfied with myself." (Agree/Disagree)	5	6
20) Do you agree with the statement, "Success is up to the individual." (Agree/Disagree)	5	5
V: ENVIRONMENTAL ATTITUDES*		
21) Do you agree with the statement, "It's okay sometimes to mark up, break or destroy property." (Agree/Disagree)	2	0
22) Do you agree with the statement, "It's okay sometimes to step on, trample, pull up or destroy plants." (Agree/Disagree)	1	1
23) Do you agree with the statement, "You should try to make your community a better place." (Agree/Disagree)	5	6
24) Do you agree with the statement, "All bugs are bad." (Agree/Disagree)	0	0
25) Do you agree with the statement, "It is all right to litter if you don't get caught." (Agree/Disagree)	0	0
26) Do you agree with the statement, "Environmental issues only affect people who live in the city." (Agree/Disagree)	1	0
27) Do you agree with the statement, "It's okay to pollute as long as you are on your own land." (Agree/Disagree)	0	0
28) Do you agree with the statement, "Everyone should try to recycle as much as they can." (Agree/Disagree)	6	5
29) Do you agree with the statement, "People should protect animals and plants." (Agree/Disagree)	6	6
30) Do you agree with the statement, "You shouldn't park your car on the grass." (Agree/Disagree)	2	3
31) Do you agree with the statement, "Food scraps and yard waste can be recycled instead of thrown away." (Agree/Disagree)	6	6
32) Do you agree with the statement, "Working with plants or being around plants has always been a part of my life." (Agree/Disagree)	2	3
33) Do you agree with the statement, "People who live in the country don't have to be environmental." (Agree/Disagree)	0	2
34) Do you agree with the statement, "People in this community think plants are important." (Agree/Disagree)	2	4

^zNumber of students selecting the first response in parentheses.

*Indicates section added by the researcher.

Table 3. "Careers and aspirations" pretest and posttest results for the six students in the Alternative Education Program Project School (AEPPS).

AEPPS test 2	Results ^a	
	Pretest	Posttest
1) As you see it now, how much schooling would you like to get eventually?		
A. Some high school	2	0
B. High school graduation	2	3
C. On the job training	0	1
D. Trade or business	0	0
E. Some college, junior college or community college	1	0
F. College graduation (4 years)	1	1
G. More	0	1
2) From the previous question how much schooling do you expect to get eventually?		
A. Some high school	2	0
B. High school graduation	3	2
C. On the job training	0	2
D. Trade or business	0	0
E. Some college, junior college or community college	0	0
F. College graduation (4 years)	1	1
G. More	0	1
3) Do you agree with the statement "My job should allow me to work with my hands"? (Agree/Disagree)	6	6
4) Do you agree with the statement "The work I do should change from day to day"? (Agree/Disagree)	3	2
5) Do you agree with the statement "My job should not have a lot of responsibility"? (Agree/Disagree)	0	1
6) Do you agree with the statement "My job should always allow me to learn something new"? (Agree/Disagree)	6	5
7) Do you agree with the statement "I should be able to keep clean at work"? (Agree/Disagree)	2	0
8) Do you agree with the statement "The only reason to have a job is for the money"? (Agree/Disagree)	2	0
9) Do you agree with the statement "I would like to work with others"? (Agree/Disagree)	5	6
10) Do you agree with the statement "I would like to work outside"? (Agree/Disagree)	6	5
11) How often do you think about what you are going to do and be after you get out of school? (Often/Seldom)	3	3
12) Are you worried about knowing what you will do after high school? (Very worried/Not worried at all)	1	2
13) Are you worried about knowing what you are best suited for? (Very worried/Not worried at all)	2	1
14) Are you worried about deciding whether you should go to college? (Very worried/Not worried at all)	1	1
15) Are you worried about knowing how much ability you really have? (Very worried/Not worried at all)	3	3
16) Are you worried about finding out how you can learn a trade? (Very worried/Not worried at all)	1	3
17) Are you worried about being able to find a job after you get out of school? (Very worried/Not worried at all)	4	3
18) Are you worried about not being able to do what you want to do when you get out of school? (Very worried/Not worried at all)	1	3
19) Are you worried about knowing what your real interests are? (Very worried/Not worried at all)	3	2
20) Have you decided on a particular kind of job that you want to aim for when you have finished your schooling? (Yes/No)	4	3
21) Do you know anyone who has a job like the one you want?		
A. No	2	1
B. Someone in my family	1	1
C. Someone I know well	1	3
D. Someone I know slightly	2	1
E. Someone I don't know personally	0	0
22) For the job you want, will you need more education than you plan on getting (Yes/No)	3	2

Students' written-in career choices: Pretest, jet pilot, marine, mechanic; Posttest, marine

^aNumber of students selecting the first response in parentheses.

ward success (Flagler, 1994, 1995). Historically, horticulture rehabilitation-vocational training programs have been reported as successful (Cotten, 1975; Hume, 1976; Nelson, 1977; Tougas, 1975). Juvenile courts are beginning to see horticultural programs as a way of teaching youthful offenders, but the need to conduct research and document the effects of these programs still exists.

This study provides an initial assessment of the effectiveness of a vocational horticulture curriculum in strengthening a delinquent individual's bonds with society, and in subsequently evoking changes in attitudes about potential for personal success and perceptions of personal job preparedness.

Materials and methods

The study population consisted of

a group of six juvenile offenders at an Alternative Education Program Project School (AEPPS) in a rural county in Virginia. The group met weekly for 3 h over 17 weeks. The curriculum (Table 1), based on job descriptions provided by horticultural professionals, was designed to present horticulture as a potential and attainable vocation. The hands-on curriculum provided the opportunity to apply learned skills, to hear

professional horticulturists who were brought into the classroom to discuss their work, and to interact with horticulture students from the local university. Horticulture was integrated into the school's existing curricula to complement existing programs by providing opportunities to teach job preparedness skills, math, science, and reading.

The six participants in the study were 14- to 16-year-old males on probation from the Virginia juvenile court system, and either expelled or suspended from their local high schools. They were a minimum of 2 years behind in school, with an average of a fourth grade reading level and fifth grade math skills.

Data collection

SOCIAL BOND TEST. To assess the juveniles' bonds with society, a social bond test (Table 2) was given as a pretest in their classroom on the first day of the program and as a posttest in a nonclassroom setting on the final day of the project. Based on Hirschi's tests (Hirschi, 1969) of social bond for juvenile delinquency, the social bond test used in this research asked questions in four categories related to the design of the curriculum: school, teachers, peers, and opinions about self. A fifth category, environmental attitudes, was developed by the researcher after reviewing related tests (Campbell et al., 1997; Flagler, 1995). The answer options were modified from Hirschi's test (1969) so that each question required that one of two answers (rather than one of five) be selected, one considered positive and one considered negative.

CAREER ASPIRATION TEST. A second test was administered to focus exclusively on career aspirations (Table 3) and was also based on Hirschi's tests with some questions adapted for this study. This test consisted of 24 questions: 4 dealt with educational goals linked to work, 8 dealt with the work environments, 11 dealt with how much the participants have considered work and how worried they were about their employment future, and 1 final question addressed the desirability of various jobs. The career and aspiration pretest was also given in the classroom on the first day of the program, and as a posttest in a nonclassroom setting on the final day of the project.

The social bond test was scored to indicate how strong the bonds with society were for each individual. Since the test questions for this project only

had two possible answers, ones (stronger social bond answers) and zeros (weaker social bond answers) were assigned based on Hirschi's interpretation of the responses (1969) to create numerical composites. A paired *t*-test was used to compare the pretest and posttest composite scores ($\alpha = 0.05$). The career and aspirations pretest and posttests were similarly tallied and compared. A visual review of answer sheets determined that no single youth's responses accounted for all or most of the shifts in the scores.

BEHAVIOR REPORTS. The youths' behavior was recorded in the school's Daily/Weekly Behavior Report. The semester before the project began, this information was collected by any of the four teachers in the AEPPS school. The semester of the research project, this information for the Friday morning horticulture class period was collected by various service-learning students who served as mentors and were trained by the teacher to complete the report. Scores ranged from zero to four, with four being the highest, and any score under four indicating a need for improvement. Only reports for Friday mornings for each semester were used for this study. A paired *t*-test was used to compare the semester prior to the research to the semester during the research.

MENTOR LOGS AND INTERVIEWS. The service-learning students who served as mentors also kept logs of their own experience, providing information to clarify and interpret the test results. Logs were reviewed for consistency of comments and themes with regard to the project and the mentors' observations on the youths' views and behaviors. Follow-up interviews conducted with AEPPS teachers and students were taken into account when reviewing the

results and developing recommendations.

INTERNSHIPS/JOB PLACEMENT. To help interpret the value of the horticulture curriculum, information was collected on participants' performance, successful completion of the horticulture training program, and acceptance into the prearranged internship or documented ability to acquire horticulture-related employment.

Due to the small size and unique nature of the group attending the school, no comparable control group could be formed. Therefore, this study cannot be used to generalize juvenile offender behavior. This study provides a summary profile of these youths' responses to vocational horticultural training. It is exploratory in nature and provides ideas for future research.

Results and discussion

SOCIAL BOND TEST. The social bond test summary (Table 4) indicates that the composite scores either improved or stayed the same, resulting in a significant increase of composite mean scores for the group.

SECTION I. School dealt with the youths' opinions and attitudes about school and its relationship to future work. Because this was a school for students who were barred from the public school system, emphasis was placed on what the youths viewed the value of school to be. This links to the student's commitment or bond to the social norm of education. The increase (54% to 75%) in positive answers in this section (Table 4) from pretest to posttest indicates that the youths strengthened their attachment to school and appeared more committed to their education. This curriculum introduced a more practical side of education, providing an obvious link to a job and a career. Attendance

Table 4. Social bond test summary for the six students in the Alternative Education Program Project School (AEPPS).

AEPPS section (cumulative number of possible answers)	Results ^a	
	Pretest	Posttest
School (24)	13	18
Teachers (30)	16	25
Peers (30)	15	17
Opinions of self (36)	26	29
Environmental attitudes (84)	67	72
Composite mean	22.8*	26.8*

^aCumulative number of positive attitudes towards questions on each topic.

*Pretest mean is significantly different from posttest mean based on a *t* test with $P = 0.05$.

records and mentors logs (data not presented) indicate that the students seemed to respond positively to the horticulture program. Attendance improved and mentors recorded several comments from the students implying that they liked learning “this stuff”, referring to the vocational horticulture information.

SECTION II. Teachers dealt with the issue of respect for teachers as figures of authority and attachment to teachers. Results are indicative of how these youths perceive all authority figures and how much they respect that authority. When the pretest and posttest results were compared for the section on teachers, they shifted to a more positive attitude, 53% positive to 83% positive (Table 4.). According to Hirschi (1969), students’ perceptions of their teachers are important because the ability to relate to the teachers within the institution of school is a way of perceiving value in authority and belief in the conventional value system where authority is regarded and observed. For the youths that participated in this study, the introduction of new mentors as teachers as well as a new curriculum which cast their existing teachers as learners may have created an atmosphere where the students could break down negative notions of authority.

SECTION III. Peers addressed the issue of how affected the youths are by their peers. As these youths are juvenile offenders, it is assumed that most of their peers are “unconventional” and hence perpetuate their desire to be delinquent. High attachment in this section thus could be interpreted as negative. If the peer culture mimics conventional society, then an attachment to peers would “foster conformity to conventional standards” (Hirschi, 1969) and be considered positive. According to Hirschi (1969), when a youth is “strongly attached to his peers, he neglects personal success... The emphasis

is on primary-group solidarity and loyalty,” and not “on personal advancement.” At the AEPPS, peer culture could normally be considered one that fosters delinquency. The 50% to 57% shift towards a greater peer bond in this section of the test could be considered somewhat negative if the attachment to other offenders is also greater. If the youths were developing peer bonds with the mentors, then this shift could be considered positive.

SECTION IV. Opinions of self dealt with the youths’ views of themselves and their potential for success. The results drawn from this section may indicate how much the youth “believes in himself” and is committed to his personal success, and how much he values his own achievement over his position within his peer group. The 74% to 80% shift toward positive answers (Table 4) may indicate a positive trend. However, half of the students still agreed with the statement “what is going to happen to me will happen, no matter what I do,” on both the pretest and posttest. With this attitude towards self-determination, these youths create a concept of themselves as helplessly propelled into new situations and perceive that “the delinquent acts are due to forces outside of themselves and beyond their control” (Hirschi, 1969).

SECTION V. Environmental attitudes inquired about views on responsibility for the environment and addressed the issue of vandalism as part of delinquent behavior. Most students appear to have answered the pretest in this section with what they believed the researchers desired the answer to be by choosing the most environmentally “correct” answer. There is evidence that this tendency is the case with most of the general public (Dillman and Christenson, 1972; McEvoy, 1972). The observations of the student actions as logged by the mentors early in the pro-

gram indicate that their answers were not truthful. The mentors noted such things as littering, mindless plant destruction, and walking through plantings and eroded areas. The posttest results showed that there was a slight positive environmental attitude shift from 80% to 87% (Table 4). It is postulated that the higher posttest score may reflect a true change in their attitudes. Late in the program, several of the mentors wrote about witnessing the boys reprimanding each other for walking through flowerbeds and making a point to walk around landscape plantings that they had created.

Career aspiration test results and discussion

The results from this test appear to indicate that positive changes in attitudes about potential for personal success and job preparedness occurred for the youths at the AEPPS and were supported by the mentors’ logs. From the pretest to the posttest (Table 3), there appeared to be an overall positive change in the youths’ views on education, specifically in the level of education that the participants wanted to finish. According to Hirschi’s social bond theory (1969), the greater a youth’s attachment to education, the less likely he/she is to commit deviant acts. An adolescent’s view of his/her expected level of education hints at how much that youth has internalized the cultural goals of success and aspirations.

In questions 3 to 10 regarding the work environment (Table 3), a total of eight point shifts indicates that the students have reconsidered these issues. The two point increase in participants who disagreed with the statement “the only reason to have a job is for the money,” indicates a potentially greater valuing of job and work for personal satisfaction. According to Hirschi, a desire of wealth over job and job prefer-

Table 5. Comparison by paired *t* test of behavior charts from Friday mornings the semester before the research to Friday mornings the semester during the research.

Variable	Mean	
	Before project ^a	During project ^a
1) Exhibits appropriate disposition toward staff and students	3.4	3.3
2) Remains focused and shows interest in learning	3.2	3.4
3) Completes assigned tasks	3.5*	3.9*
4) Constructive attitude	3.3	3.3
5) Refrains from distracting others and seeking attention	3.4	3.2
6) Respectful of buildings, grounds, and equipment	3.8*	3.4*

^aBased on a scale of 1 to 5.

*Significant at *P* = 0.05.

ence can be a measure of potential for delinquency.

The questions 11 to 20 addressing the youths' thoughts and fears about their future with regard to employment and employability (Table 3) showed a slightly increased level of anxiety indicative that the youth were thinking more about careers and career options.

Behavioral report results and discussion

The daily behavioral reports (Table 5) at the AEPPS monitored six behaviors that are indicators of social bond. The results of a paired *t* test indicated a behavioral change for two variables: the students' ability to complete tasks increased, and the students' respect for the grounds decreased. The increase in the students' ability to complete tasks may be due to the hands-on nature of the program, and may indicate that the students enjoyed the outdoor horticultural tasks more than their traditional classroom tasks. The mentor logs support this idea, noting conversations with students and among students on this topic. The students' decrease in demonstrated respect for the grounds was possibly due to the significant increase in amount of time spent on the grounds and the unstructured, hands-on learning environment that encouraged the students to manipulate the grounds. In addition, the evaluations during the second semester were done by the horticulture service-learning students, who may have held the youths to a higher standard for environmental conduct than the teachers had the first semester.

Internship/job placement

Two boys were hired in horticultural internship positions with the municipality. One youth was selected as an alternate and did not secure other horticultural employment for the summer, but this youth's age (14 years) made finding a job difficult. A fourth boy secured a full-time summer position on the grounds of Virginia Tech. The two remaining boys independently took their resume and record of horticultural training and obtained horticultural jobs in the local community.

According to the school staff in a follow-up interview 6 months after the research was completed, the work experiences were very valuable for the boys. Their science/math teacher indicated that he planned to continue the horticulture program at the boys' request.

He felt that the horticulture program contributed to his curriculum and the vocational information was valued by the students.

Conclusion

This research indicates that this vocational horticulture curriculum may be a tool to improve social bonding of juvenile offenders, and that the tested curriculum appeared to be effective at evoking certain changes in attitudes about personal success and individual perceptions of personal job preparedness. The data appear to indicate that this curriculum has motivated these youths to develop goals and seriously consider their future plans. Another apparent benefit of this curriculum was that it provided the youths with the chance to develop pride in themselves through work and the opportunity to prove that they could be successful, and hence, develop a positive self image.

Unfortunately, because of their backgrounds, juvenile offenders usually do not come from homes or communities where they encounter positive role models (Hirschi, 1969; Kaplen, 1975). Even with the advantage of programs like this one, which was designed to teach useful skills, provide positive role models, and develop personal esteem, it is often hard to counter the effects of negative influences. This is particularly evident with a short-term program. It is widely believed that short-term programs lead to short-term success, and to achieve any sort of long-term success requires a long-term commitment (Gardner and Shoemaker, 1989; Kaplen, 1975; Lysterly and Skipper, 1981; Rice and Remy, 1994). A long-term program with more resources could help these youths to develop goals and solidify their future plans more than was addressed in this curriculum, helping them recognize the need to be concerned about these issues yet alleviating fears expressed about finding work.

Literature cited

Campbell, A.N., T.M. Waliczek, J.C. Bradley, J.M. Zajicek, and C.D. Townsend. 1997. The influence of activity-based environmental instruction on high school students' environmental attitudes. *HortTechnology* 7(3):309.

Cotten, M. 1975. Effectiveness of horticultural therapy in lowering aggressiveness of institutionalized delinquent adolescents. *Natl. Council for Therapy and Rehab. through Hort. Nwslt.* 1(5):2-4.

Dillman, D.A. and J.A. Christenson. 1972. The value for pollution control, p. 237-257. In: W.R. Burch, N.H. Creek, and L. Taylor (eds.). *Social behavior, natural resources, and the environment*. Harper and Row, Publishers, New York.

Finch, C.R. 1995. Green Brigade: Horticultural learn-and-earn programs for juvenile offenders. *HortTechnology* 5(2):118-120.

Flagler, J. 1994. Corrections and the green industry, p. 283-291. In: Flagler, J. and R.P. Poincelot (eds.). *People-plant relationships: Setting research priorities*. Hawthorn Press, New York.

Flagler, J. 1995. The role of horticulture in training correctional youth. *HortTechnology* 5(2):185-187.

Gardner, L. and D.J. Shoemaker. 1989. Social bonding and delinquency: a comparative analysis. *Sociol. Quart.* 3(30):481-500.

Heeren, J. and D. Shichor. 1990. Mass media and delinquency prevention: the case of scared straight. In: C. Bryant (ed.). *Deviant behavior: Readings in sociology of norm violations*. Hemisphere Publ. Co., New York.

Hirschi, T. 1969. *Causes of delinquency*. Univ. Calif. Press, Berkeley.

Hume, E. 1976. Vocational gardening at the Monroe Reformatory. *Nat. Council for Therapy and Rehab. through Hort. Nwslt.* 2(4):3-4.

Kaplen, H. 1975. *Self-attitudes and deviant behavior*. Goodyear Publishing Company, Inc., Pacific Palisades and Los Angeles, Calif.

Lysterly, R.R. and J.K. Skipper, Jr. 1981. Differential rates of rural-urban delinquency: A social control approach. *Criminology* 19(3):385-399.

McEvoy, J. 1972. The American concern with the environment, p. 214-237. In: W.R. Burch, N.H. Creek, and L. Taylor (eds.). *Social behavior, natural resources, and the environment*. Harper and Row, New York.

Nelson, G. 1977. FTD shop joins industry with criminal justice system. *Natl. Council Therapy and Rehab. through Hort. Nwslt.* 3(4):2.

Rice, J.S. and L.L. Remy. 1994. Cultivating self-development in urban jail inmates, p. 229-257. In: M. Francis, P. Lindsey, and J.S. Rice (eds.). *The healing dimensions of people-plant relations: A research symposium*. Ctr. Design Res., Dept. Environ. Design, Univ. Calif, Davis.

Tougas, M. 1975. Project Mother Earth. *Natl. Council for Therapy and Rehab. through Hort.* 2(4):1-3.