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The Effect of School Gardens on Children's Interpersonal Relationships and Attitudes Toward School

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ADDITIONAL INDEX WORDS. gardening, environmental education, children's horticulture, horticultural therapy, elementary education, outdoor education

SUMMARY. Children's gardens are receiving increased attention from communities and schools. Educators recognize that gardens provide beauty, produce and education, and serve as an outlet in which gardeners may gain personal benefits. The objectives of this research study were to evaluate whether children participating in garden activities benefited by an improvement in interpersonal relationships and attitudes toward school. No significant differences were found between pre- and posttests and the control and experimental group comparisons. However, demographic comparisons offered interesting insight into trends in the data. Female students had significantly more positive attitudes towards school at the conclusion of the garden program compared to males. The results also showed that there were differences in interpersonal relationships between children depending on grade level in school. In addition, children's attitudes toward school were more positive in schools that offered more intensive individualized gardening.

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Nature and gardening have been thought to have physical and psychological benefits for decades (Watson and Burlingame, 1960). Research has shown that gardens provide adults with psychological benefits (Kaplan, 1973; Shoemaker, 1982; Soleri, 1986), yet research on children has focused more towards outdoor environments in the form of nature camps. This research has indicated outdoor environments can enhance mental health of youth (Dressner and Gill, 1994; Hanson, 1977; Kaplan, 1977). However, research in the area of gardening and its effect on children and adolescents is limited.

The purpose of this research was to determine if the integration of the Project GREEN school garden program (Waliczek and Zajicek, 1996) into school curriculum positively influenced interpersonal relationships and attitudes toward school of participating students.

Materials and methods

GARDENING ACTIVITIES. The Project GREEN Activity Guide: Book 1, Math and Science (Waliczek and Zajicek, 1996) was developed for elementary and junior high math and science school teachers to integrate into the classroom curriculum. It was divided into six units that each consisted of an introduction and individual learning experiences with several objectives and a variety of activities (Skelly and Zajicek, 1998). The activities did not build upon each other, and their use as supplemental material within lesson plans was left up to the discretion of each participating teacher.

POPULATION. The study was conducted during the 1995–96 school term. The research was in collaboration with schools in Texas and Kansas. Seven schools and 598 students were included in the study. The participating students volunteered and were from grades two through eight. The experiment consisted of both a control and an experimental group. Students in the Project GREEN garden program throughout the spring semester 1995. These students were pretested at the start of the spring semester in January and posttested at the end of the gardening season in May. Students in the control group were obtained from the norming population of the testing instrument used in the study.

INSTRUMENTATION. The Behav-

Table 1. The effect of gender on attitude toward school and interpersonal relationship Behavior Assessment System for Children (Reynolds and Kamphaus, 1992) posttest scores of children in the Project GREEN research study determined by a multivariate analysis of variance with pretests acting as covariates.

Variable of interest and gender	n	Mean score	SD	df	F value	P
Attitude toward school						
Female	312	49.07	10.34	1	12.762	0.000
Male	233	53.89	10.96			
Interpersonal relationships						
Female	307	51.22	9.86	1	1.665	0.197
Male	231	49.15	11.42			

Table 2. The effect of grade on attitude toward school and interpersonal relationship Behavior Assessment System for Children (Reynolds and Kamphaus, 1992) posttest scores of children in the Project GREEN research study determined by a multivariate analysis of variance with pretests acting as covariates.

Variable of interest and grade	Mean score	n	SD	df	F value	P
Attitude toward school						
Second grade	14	41.43	5.03	6	1.588	0.149
Third grade	35	50.06	10.48			
Fourth grade	98	49.16	9.99			
Fifth grade	39	52.21	9.76			
Sixth grade	58	53.22	10.17			
Seventh grade	276	51.34	11.47			
Eighth grade	25	56.84	9.02			
Interpersonal relationships						
Second grade	14	49.14	12.59	6	4.186	0.000
Third grade	35	46.11	11.81			
Fourth grade	98	49.12	11.69			
Fifth grade	39	50.64	8.98			
Sixth grade	58	49.72	10.52			
Seventh grade	276	51.78	9.92			
Eighth grade	25	46.52	10.87			

ior Assessment System for Children (BASC) was the psychological inventory used for the study (Reynolds and Kamphaus, 1992). It is superior to other similar tests in that it has been tested extensively for language difficulties, bias, reliability and validity (Reynolds and Kamphaus, 1992). The reliability for the BASC is 0.90.

This study used only one component of the BASC system, the Self-Report of Personality scale for children and adolescents. The Self-Report of Personality scale has a form for children aged 8 to 11 years and a form for adolescents aged 12 to 18 years. Since children 8 to 15 years of age took part in the study, both forms were used. Statements concerning interpersonal relationships and attitude toward school were listed and answered either true or false by circling T or F. A demographic

information section was included in the pretest instrument. It included multiple-choice questions concerning gender, ethnicity and age.

DATA COLLECTION. Copies of pretests were distributed to the schools by hand or through postal delivery at the beginning of the spring semester in January 1996. Posttests were distributed in the same way at the end of the spring semester in May 1996. The questionnaires were returned to the researcher by hand or through the mail.

DATA ANALYSIS. Psychological variables were scored using the BASC Enhanced Assist computer program (Stanton, 1994). The computer program identified any suspicious tests that students submitted, and these tests were removed from the study. The range and direction of scores for each variable differed on what was considered normal

and healthy for children. Higher scores are considered more positive for the variable of interpersonal relationships with scores of 40 or below indicating problems socializing with others. Higher scores on the scale indicate that children have a desire for social interaction with peers and adults. In contrast, lower scores are indicative of more positive attitudes toward school. Scores below 41 indicate that a child has a relative satisfaction with the usefulness of attending school and of school-related matters.

All data were analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows Release 7.0 (SPSS Inc., Chicago). Missing answers were coded as missing values. The differences between pre- and posttest scores for individuals in the experimental group were tested using paired *t* test analyses. Experimental pretest scores and control group norm scores were compared using independent *t* test analyses. To compare posttest scores based on demographic information, multivariate analysis of variance tests were used with pretest scores acting as covariates.

Results and discussion

No statistically significant differences were found in comparisons of the experimental and control groups. In addition, no statistically significant differences were found in comparisons of the pre and posttests of children who gardened except in the category of attitude toward school for adolescents. The garden appeared to have a negative effect on adolescents concerning this variable. One explanation for these lower scores could be the timing of the posttest instrument, which was administered at the end of the school year. Adolescents may have more negative views toward school at this time.

In demographic analyses of gender, grade level and school, statistically significant differences were found in posttest comparisons using pretest scores as covariates.

GENDER. Female students had significantly more positive attitudes towards school at the conclusion of the garden program compared to males ($P < 0.001$) (Table 1). Traditional curriculum materials have been found, in some cases, to distance females due to stereotyping, selectivity or male-exclusive language (Shankshaft, 1987). Effort was made in the development of the Project GREEN activity guide to use nonbiased language and graphics, which may have

Table 3. The effect of the participating schools on attitude toward school and interpersonal relationship Behavior Assessment System for Children (Reynolds and Kamphaus, 1992) posttest scores of children in the Project GREEN research study determined by a multivariate analysis of variance with pretests acting as covariates.

Variable of interest and school	School location	Mean score	n	SD	df	F value	P
Attitude toward school							
All Saint's	Kansas City, KS	102	53.72	10.96	6	2.360	0.029
Bozeman	Lubbock, TX	93	50.00	9.31			
College Station Jr. High	College Station, TX	245	51.04	11.40			
Havencroft	Olathe, KS	14	41.43	5.03			
Lamar	Corpus Christi, TX	27	49.11	10.40			
Rock Prairie	College Station, TX	28	47.57	9.13			
St. John's/Holy Family	Kansas City, KS	36	55.39	10.38			
Interpersonal relationships							
All Saint's		101	49.18	11.09	6	1.562	0.156
Bozeman		92	48.78	9.30			
College Station Jr. High		241	51.70	10.16			
Havencroft		14	49.14	12.59			
Lamar		27	46.04	14.07			
Rock Prairie		28	52.75	8.93			
St. John's/Holy Family		35	50.17	11.52			

contributed to the positive response from females to the garden program used in this study. No differences were found in comparisons of interpersonal relationships.

GRADE. Statistical significance was found in the variable of interpersonal relationships due to grade level ($P < 0.001$) (Table 2). Seventh grade students (12 to 13 years old) had the most positive interpersonal relationship scores of all grades. Teacher surveys indicated that these older groups of children were allowed to work independently, which may have increased socialization, compared to the younger children who worked in more supervised conditions. Other studies have mentioned the benefits of the garden to socialization and interpersonal relationships (Waliczek et al., 1996), and have shown that outdoor environments influence children and adolescents positively in this area (Dressner and Gill, 1994; Kaplan, 1977). No differences were found in comparisons of the variable of attitude toward school.

SCHOOL. Statistically significant differences were found in students' attitude toward school based on the variable of school ($P = 0.029$) (Table 3). Posthoc comparisons (least significant difference) and teacher questionnaires distributed at the conclusion of the study indicated that students attending schools that allowed children more individual participation in the garden had more positive attitudes toward school when compared to the students at other schools involved in the study. Baum et

al. (1985) reported that students who worked independently in a garden program and were encouraged to take responsibility for their actions had a more positive attitude toward school. No differences were found in comparisons of interpersonal relationships.

Learning is due to the experiences of students and depends directly on these experiences. Education must take into account the value of learning through direct experience (McCormick et al., 1989; Shinn, 1988). School gardens offer children a hands-on learning tool that gives them direct experiences with living things. A large percentage of children today are growing up in urban and suburban areas and lack these types of experiences (Chawla and Hart, 1988). Results from this study show that school gardening can not only give children important interactions with the natural world, but may impact the psychological factors of particular groups of children.

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